

A REVISION OF THE FAMILY SYRINGOPHILIDAE
(PROSTIGMATA: ACARINA)¹

By

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ABSTRACT

The family Syringophilidae is revised at a generic level and a key to the two named and fifteen new genera is given.

The named genera and their type species are: Syringophilus Heller, 1880, S. bipectinatus Heller, 1880; Picobia Haller, 1878, P. heeri Haller, 1878. New genera and their type species are: Syringophilopsis, Syringophilus elongatus Ewing, 1911; Aulobia, Syringophilus dendroicae Clark, 1964; Aulonastus, A. pipili, n. sp.; Chenophila, C. branta, n. sp.; Selenonycha, S. baltoda, n. sp.; Creagonycha, C. lara, n. sp.; Niglarobia, N. ereuneti, n. sp.; Syringophiloidus, Syringophilus minor Berlese, 1887; Philoxanthornea, P. anoa, n. sp.; Peristerophila, Syringophilus columbae Hirst, 1920; Ascetomylla, A. gallinula, n. sp.; Trypetoptila, T. casmerodia, n. sp.; Stibarokris, S. phalacrus, n. sp.; Syringonomus, S. bulwerius, n. sp.; Torotroglia, T. mima, n. sp.

The following named species of Syringophilus are transferred to new genera: S. hylocichlae Clark, 1964, S. turdi Fritsch, 1958, S. fringillae Fritsch, 1958, and S. passerinae Clark, 1964, to Syringophilopsis; S. totani Oudemans, 1904, to Creagonycha; S. helleri Oudemans, 1904, and S. trouessarti Oudemans, 1904, to Niglarobia; S. zenadoura Clark, 1964, to Peristerophila; S. dryobatis Fritsch, 1958, and S. zumpti Lawrence, 1959, to Picobia; and S. villosus (Hancock, 1895), to Torotroglia. The synonymy S. elongatus (Ewing, 1911) (= S. icteridae Clark, 1964) is recognized. The following species were not seen and they cannot be assigned to a genus on the basis of their descriptions: S. anthi

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Fritsch, 1958; *S. bisetatus* Fritsch, 1958; *S. glandarii* Fritsch, 1958; *S. major* Berlese, 1878; *S. troglodytis* Fritsch, 1958.

The family Heterochelidae Tragardh is transferred from the superfamily Cheyletoidea to Anystoidea.

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INTRODUCTION

The cheyletoid family Syringophilidae Lavoipierre, 1953, includes a group of twenty-four species of avian parasites. The genera of Syringophilidae are now known from almost two hundred species of birds, representing sixteen orders and forty-six families, from all the major geographic regions of the world. This is a generic revision with new species described only as types of new genera. Although only eleven new species are described, material representing over one hundred twenty-two species was examined; additional species will be described in subsequent studies.

This study clarifies the relationships of the family Syringophilidae within the superfamily Cheyletoidea and establishes a classification at the generic level that can serve as a foundation for quill mite studies at the species level.

COLLECTION AND PREPARATION OF MATERIAL

Syringophilid specimens were acquired by field collections, loans, and examination of frozen birds. Initial collections were made from preserved birds in the Department of Entomology at the University of Georgia. All flight feathers (primaries, secondaries, all coverts, alulars, and retrices) were removed and examined. Heavy infestations of mites discolor the clamus and were easily discovered by gross observation. Very low numbers, such as one or two individuals per quill, were detected under a dissection microscope using a strong reflected light source.

Live mites and the infested quills were transferred to vials containing 70% ethyl alcohol. Specimens preserved in alcohol for long periods required clearing in lactophenol at 70°C for forty-eight hours. Similar treatment was required for rehydration of dead mites taken from frozen birds. Specimens were mounted on microscope slides in PVA medium (Lipovsky, 1953; Beer, 1954). This solution was found to be the most satisfactory for preparation of these soft-bodied mites.

A phase-contrast microscope was used for the study of the slide mounted specimens. Measurements were made with the aid of an ocular micrometer, and drawings were prepared using a Wild microscope and drawing attachment.

TAXONOMY

HISTORICAL REVIEW

The family Syringophilidae was erected by Lavoipierre (1953) to include those mites "armed with plates, leg I...unmodified, and the palp is well developed in some species." Prior to 1953, Syringophilus and Picobia were placed in Myobiidae (Baker, 1949; Ewing, 1938). Lavoipierre transferred only Syringophilus to the new family, apparently being unaware of the existence of Picobia. Actually, Picobia appeared in the literature from 1906 until the present only as a name in checklists.

Dubinin (1957), unaware of Lavoipierre's paper, divided the complex of Myobiidae into the families Harpyrhynchidae, Ophioptidae, Myobiidae, and Syringophilidae. Dubinin characterized Syringophilidae (containing Syringophilus and Picobia) as: mites 3-3.5 times longer than wide, possessing piercing chelicerae internal to a stylophore; with legs III and IV separate from the anterior two pairs of legs, all legs being equally formed (Syringophilus) or legs I and II more compressed than III and IV (Picobia), and living inside the

quills of flight feathers or subcutaneous in the wing tissue of birds.

Although both Syringophilus Heller, 1880, and Picobia Haller, 1878, were established many years ago, little work has been published concerning the nature of these mites. Considerable confusion exists concerning the species, genera and even the family. The only comprehensive treatment of Syringophilus and Picobia was presented by Oudemans (1906). Various authors (Hancock, 1895; Ewing, 1911; Lawrence, 1959; and others) described new species but gave incomplete descriptions. Fritsch (1958) and later Clark (1964) described and assigned additional species to Syringophilus. Unfortunately, only the holotypes of four species and paratypes of six additional species are known to exist. All of Fritsch's material was destroyed (in litt., H. J. Stammer) and Clark's holotypes were lost in transit to the U. S. National Museum (in litt., E. W. Baker).

Prior to the present study, twenty-three species in the genus Syringophilus and one species in the genus Picobia were assigned to the family Syringophilidae. Inadequate literature reviews and insufficient generic definitions have led to the incorrect placement of species by several authors (Fritsch, 1958; Lawrence, 1959; and Clark, 1964). Critical examination of the twenty-three named species of Syringophilus clearly indicated that the genus has become a confusing conglomerate of diverse forms. Excepting several works describing single species, the majority of the literature references are checklist citations.

SYSTEMATIC POSITION OF SYRINGOPHILIDAE IN CHEYLETOIDEA

The superfamily Cheyletoidea is characterized as follows: cheliceral bases completely fused with subcapitulum and forms a stylophore lacking a median division; movable chela straight and styletlike, or long and whiplike; peritreme internal to the stylophore and usually M-shaped; a single median dorsal opening present on the stylophore; adults lack pseudostigmata and genital discs; usually with a palpal thumb-claw complex; free living or parasitic on vertebrates. The families which lack the thumb-claw complex are more specialized morphologically and biologically. Among the parasitic species, the genital opening of the male has migrated from a ventral position to a terminal and finally true dorsal locus. Camin et al. (1967), noted that among prostigmatid mites, the dorsal location of the male genital opening is restricted to the Cheyletoidea.

The following families are presently placed in Cheyletoidea:

<u>Family</u>	<u>Biological Association</u>
Cheyletidae Leach 1814	free living, predaceous
Harpyrhynchidae Dubinin 1957	bird skin
Syringophilidae Lavoipierre 1953	bird quills
Myobiidae Megnin 1877	mammal skin
Psorergatidae Dubinin 1955	mammal skin
Demodicidae Nicolet 1855	mammal skin
Ophioptidae Southcott 1956	snakes
Chloracaricae Camin <u>et al.</u> 1967	turtle cloaca
Heterochelidae Tragardh 1950	beetles (Passalidae)

Baker et al. (1958) incorrectly credits Dubinin with the authorship of Syringophilidae and Ophioptidae. Heterochelidae Tragardh 1950, should be removed to the Anystoidea (Cunliffe, 1955) due to the presence of a suture on the stylophore and a pair of propodosomal pseudostigmata.

The high degree of specialization of the parasitic forms within the Cheyletoidea makes interfamilial relations difficult to ascertain. Modifications for parasitic life are so great as to obscure the relations of structures and/or setae among

certain groups in this superfamily. The legs and idiosomal setation have been reduced in Chloracaridae, Ophioptidae, Demodicidae, and Psorergatidae. Myobiid mites have conspicuous elaborations of legs I. The remaining families - Cheyletidae, Harpyrhynchidae, and Syringophilidae - are closely related. The presence of segmented legs III and IV and ambulacra in species of Harpypalpus Dubinin 1957, indicates an intermediate degree of specialization between cheyletids and species of Harpyrhynchus Megnin 1878. Comparative chaetotaxy reveals that the syringophilids are close to the cheyletids that are habitually found inside feather shafts.

DIAGNOSIS OF SYRINGOPHILIDAE

Syringophilidae Lavoipierre 1953

The family Syringophilidae is characterized within the Cheyletoidea as follows: elongate to oval, soft-bodied mites with long needlelike chelicerae and complete stylophore; palpus four segmented lacking a well developed thumb-claw complex; peritreme well developed; legs I-II distant from legs III-IV; ambulacrum composed of two claws separated by a bipectinate empodium; male genito-anal opening dorsal; living in quills of flight feathers of birds or subcutaneous in the epidermis of the wing.

CHARACTERS AND DESCRIPTIVE METHODS

Listed below are explanations of terms and relative measurements employed as diagnostic or descriptive characters for the mite genera involved in the study. The explanations parallel the sequence used in the formal descriptions.

Gnathosoma - characters 1-6

The gnathosoma consists of the stylophore, movable digits, hypostome, and paired palpi. The movable digits of the chelicerae and the peritremes are internal to the stylophore (Fig. 1).

1. Hypostomal apex: Highly ornate (Figs. 10 C, D; 12 C, D), hypostome produced anteriorly into hyaline expansions and protuberances; slightly ornate (Fig. 23 C, D), hyaline protuberances present, but inconspicuous; smooth (Fig. 22 C, D), hyaline protuberances absent.

2. Lateral hypostomal teeth: Present - lateral sclerotization of the hypostomal lips protruding in the region of the adoral setae (Fig. 36 C, D); absent - sclerotization of lateral hypostomal lips lacking, although an apodeme internal to the surface of the adoral setae may be present.

3. Movable chela: Dentate - small, often minute teeth present on the distal tip of the digit; edentate - lacking teeth.

4. Peritremes: Shape of the peritreme - "U" shaped - recurrent, or longitudinal branches produced posteriorly, displacing the lateral branches (Fig. 8 C); "M" shaped - recurrent branches not produced posteriorly (Figs. 14 C, 16 C). The maximum and minimum number of chambers in each of the lateral and longitudinal branches is given for each of the species studied.

5. Stylophore: Shape of posterior portion of the stylophore: rounded - tapered to a gentle curve (Figs. 18 A, 20 A, 27 A); constricted - with a constriction and further elongation (Fig. 36 A). Relation to propodosomal plate: subcutaneous - extending posteriorly under the propodosomal plate (Fig. 22 A); independant - not extending posteriorly under the propodosomal plate (Fig. 1).

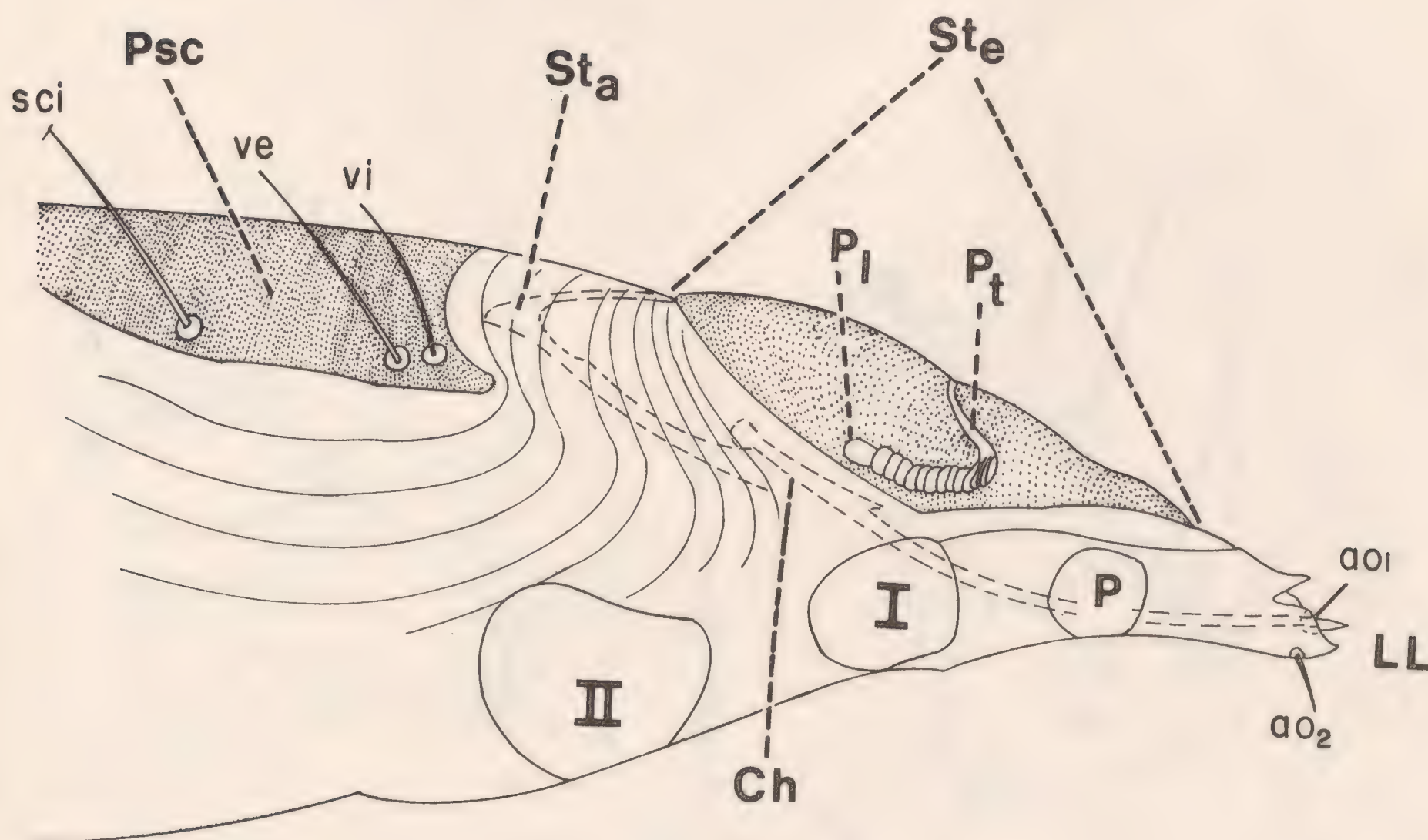


Fig. 1. Lateral aspect of *Aulobia dendroicus* (Clark): Ch, movable digit of chelicera; LL, lateral hypostomal lips; P, acetabulum of palpus; Pl, longitudinal branch of peritreme; Psc, propodosomal plate; Pt, transverse branch of peritreme; Sta, apodemal portion of stylophore; Ste, exposed portion of stylophore; I, acetabulum of leg I; II, acetabulum of leg II. ao1, ao2 - adoral setae; vi, ve, sci - propodosomal setae.

6. Condition of palpal apex: Rounded - distal margin of palpal tibiotarsus rounded with omega ventrad of K', K'' (Fig. 2 A); truncate - distal margin of palpal tibiotarsus truncate with omega in the same plane as K', K'' (Fig. 2 B).

Idiosoma - characters 7-17

A combination of signatures for the idiosomal setae has been used for the dorsal propodosomal setae; Baker, 1965, for the dorsal hysterosomal setae; and Grandjean, 1944 for the ventral idiosomal setae. The positions and corresponding designations for the setae of the body exclusive of the legs are found in Fig. 3 A, B and Fig. 4 A, B.

7. Setal types of idiosoma and legs (except a', a'' of tarsi I-IV): smooth - setiform and hairlike (Fig. 27 C); annulate - circular or spiral sculpturing on the seta (Fig. 34 C); knobbed--regularly arranged rounded raised portions on the surface of the seta (Fig. 36 E); normal base--diameter of the seta at the base as large or greater than the diameter slightly distad (Fig. 27 C); constricted base--diameter of the seta at the setal base less than the diameter slightly distad (Fig. 36 E).

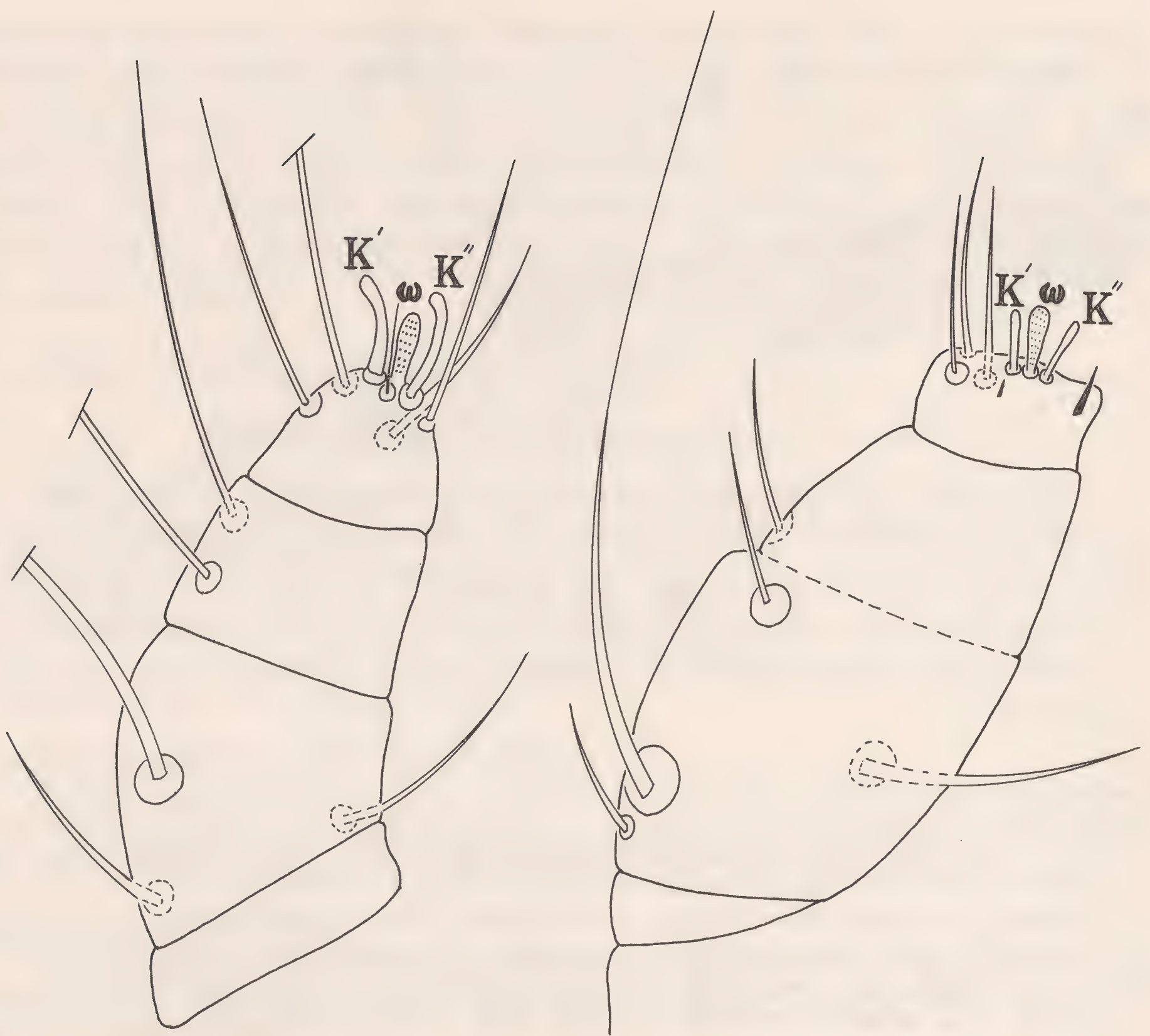


Fig. 2. Dorsal aspect of left palpus: A, Distal margin of tibiotarsus rounded, *Syringophiloidus* sp.; B, Distal margin of tibiotarsus truncate, *Picobia zumpti* (Lawrence); omega-solenidion; K', K''-eupathids.

8. Condition of propodosomal plate: Divided--separated into right and left portions; fragmented--disjunct sclerotization around the bases of the setae; not divided: rectangular--margins relatively straight; variable--conditions of margins as scalloped, cleft, or concave.
9. Hysterosomal plate: Present--sclerotized in the region of setae 12, d3, 13; absent--sclerotization absent in the region of setae 12, d3, 13. If present, the hysterosomal plate may fuse with the pygidial plate, see #12 below.
10. Setae in region of propodosomal plate: Six pairs of setae (vi, ve, sci, sce, d1, 11) or five pairs (vi absent) are associated with the propodosomal plate. Configurations of the setae are translated into numerical patterns by counting the vertical and scapular setae in a longitudinal direction, and d1, 11 in a transverse direction as: 3-1-2, Fig. 5 A; 2-2-2, Fig. 5 C; 2-1-1-2, Fig. 5 D; 3-2-1, Fig. 5 E. The patterns differ in the male and are not employed as a character.

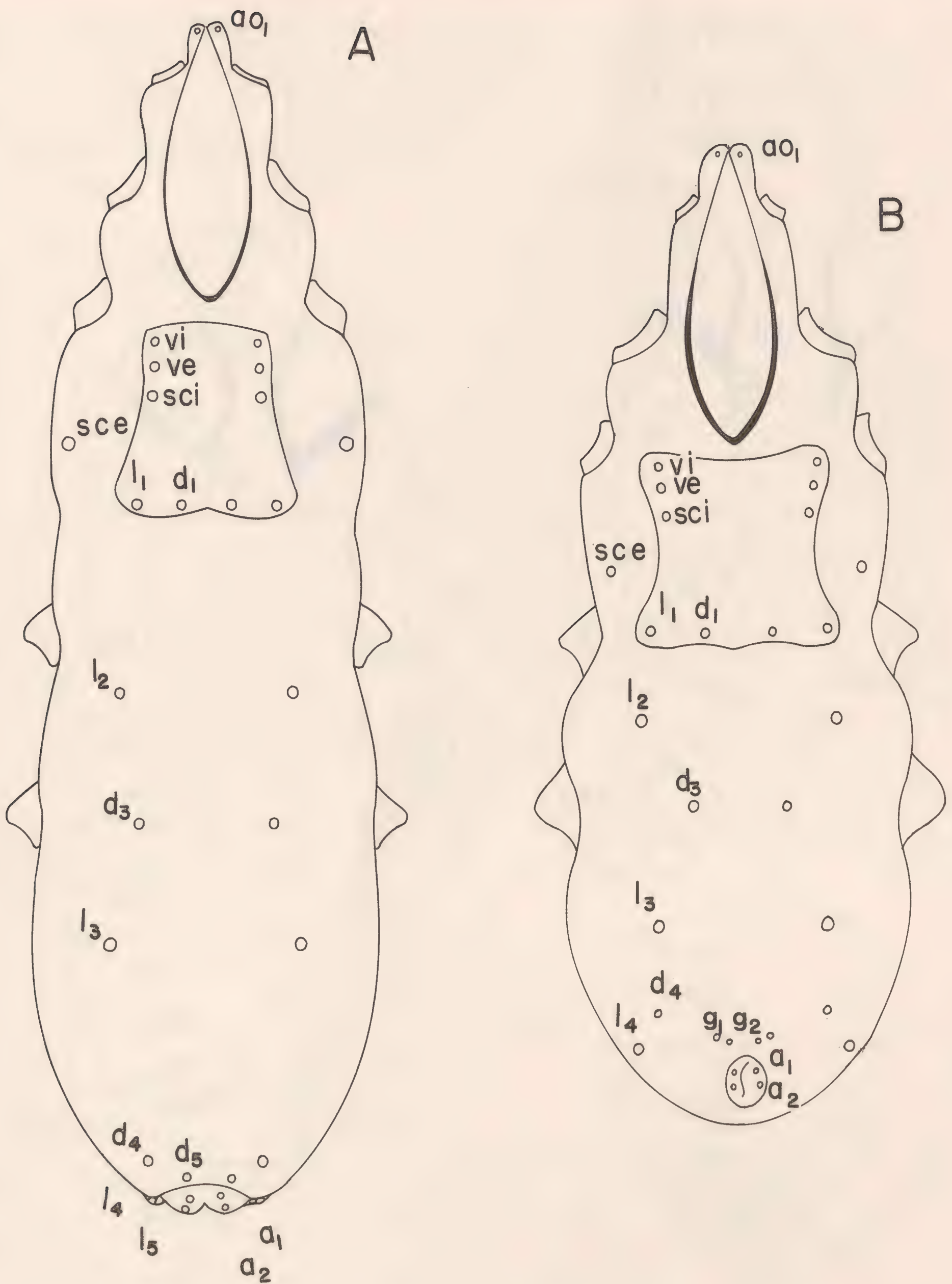


Fig. 3. Setal signatures of body. dorsum: female, A; male, B. ao1 - adoral; a1, a2 - anal series; d1, d3, d4, d5 - dorsal series; g1, g2 - genital series; l1 to l5 - lateral series; sci - scapular internal; sce - scapular external; vi - vertical internal; ve - vertical external.

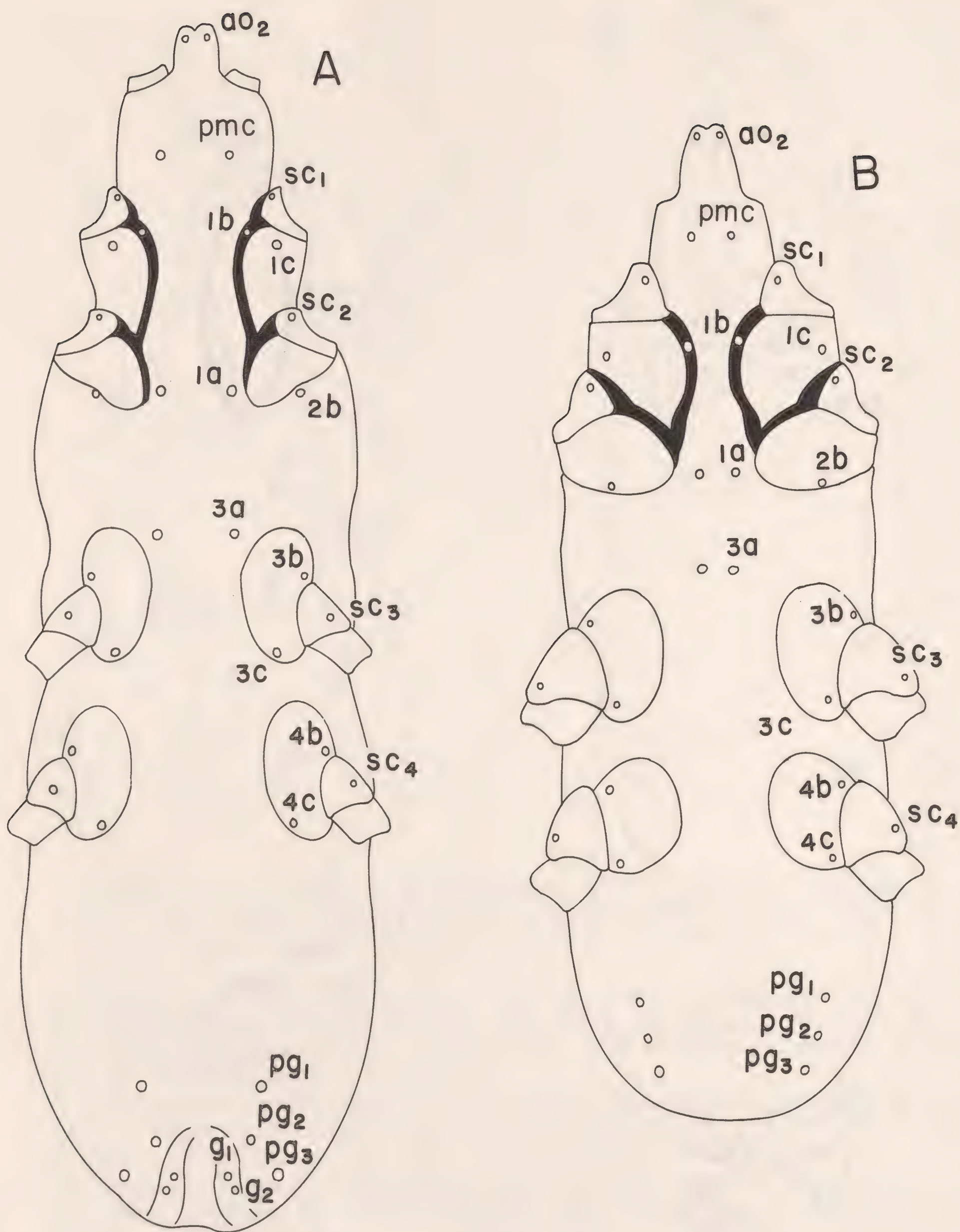


Fig. 4. Setaal signatures of body, venter: female, A; male, B. ao2 - adoral; 1a, 1b, 1c - coxa I; 2b - coxa II; 3a, 3b, 3c - coxa III; 4b, 4c - coxa IV; g1, g2 - genital series; pg1, pg2, pg3 - paragenital series; pmc - subcapitular; sc1 to sc4 - trochanters I to IV.

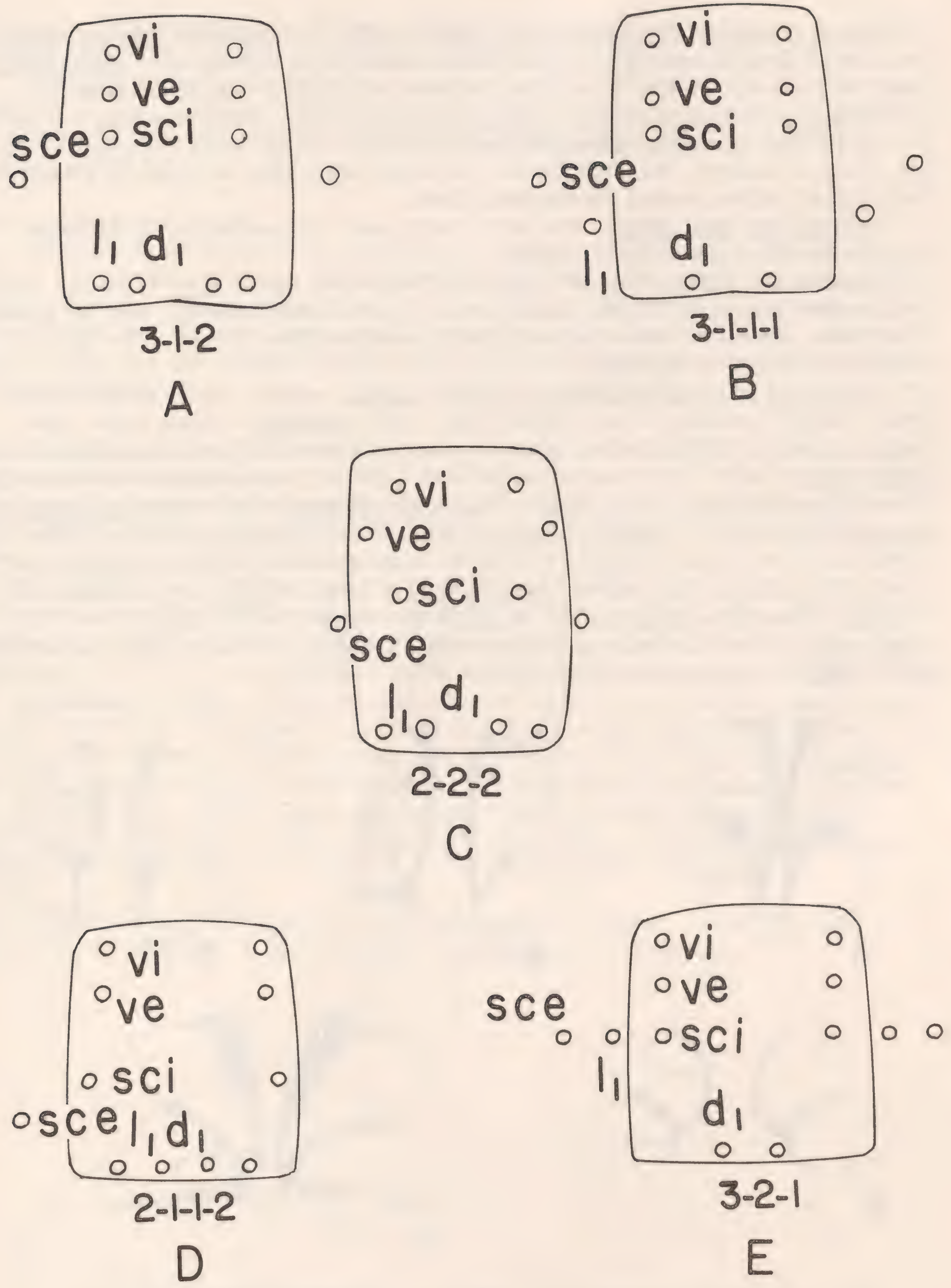


Fig. 5. Diagrammatic representation of configurations of setae associated with propodosomal region. See text, p.8, for explanation.

11. Setae in region of hysterosomal plate (d2, d3, l3): Relative lengths--long--equal to or greater than d1; short--conspicuously shorter than d1. Arrangement--relative positions of the setae to each other as stated in the descriptions.

12. Relative lengths of terminal setae (d4, l4, d5, l5): Female--Long--equal to or greater than d1; short--conspicuously shorter than d1; male--d5, l5 absent, d4, l4 as in female. Any combination of these setae may be borne on a weakly sclerotized region termed the pygidial plate.

13. Genital and anal setae: one or two pairs each of genital and anal setae present in either the male or female.

14. Paragenital setae: Female--typically with three pairs; male typically with two or three pairs; additional pairs (1-6), termed supernumerary, may be present. The stated number of setae includes the entire complement, i.e., the basic plus supernumerary members.

15. Condition of coxal apodemes I and II: Parallel--mesal coxal apodemes of legs I (MCA1) parallel to each other (Fig. 6 A); divergent--mesal coxal apodemes of legs I (MCA1) curve laterally along posterior 1/2 of length (Fig. 6 B, D); convergent--mesal coxal apodemes of legs I (MCA1) curve mesally toward each other along posterior 1/2 of length (Fig. 6 E); degree of curvature--strongly divergent (Fig. 6 D), or weakly divergent (Fig. 6 B, C); fused--union of mesal coxal apodeme of leg I (MCA1) and mesal coxal apodeme of leg II (MCA2) prominent (Fig. 6 B, C, D); point of fusion--MCA1 fused to MCA2 at posterior 1/2 of MCA2 (Fig. 6 B), MCA1 fused to MCA2 at anterior 1/2 of MCA2 (Fig. 6 C); free--union of mesal coxal apodeme of leg I (MCA1), to mesal coxal apodeme of leg II (MCA2), lacking or imperceptible (Fig. 6 A, E).

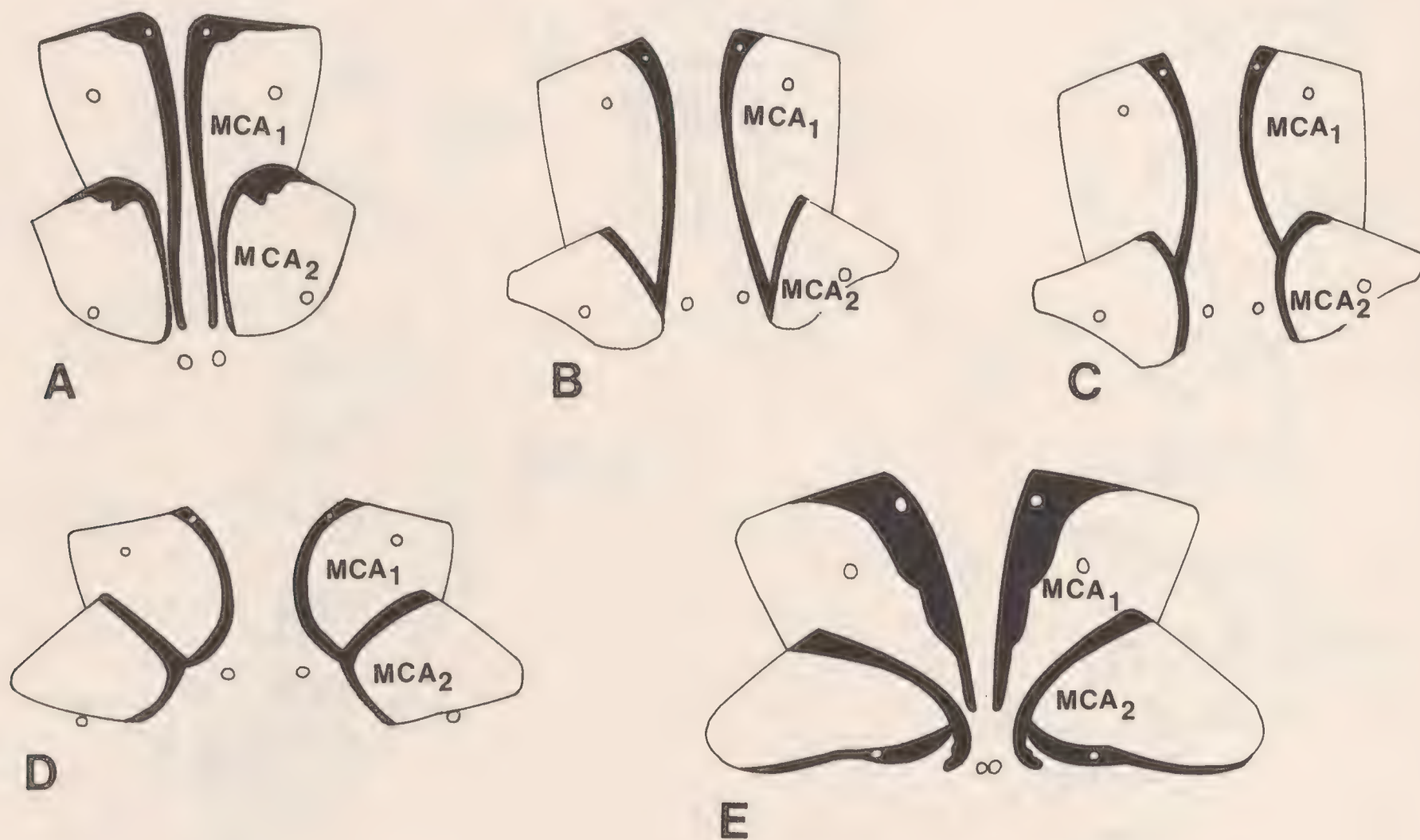


Fig. 6. Region of coxae I-II, female: A, Syringophiloidus minor; B, Syringophilus bipectinatus; C, Syringophilopsis elongatus; D, Selesonycha baltoda; E, Picobia sp.--MCA1-mesal coxal apodeme leg I; MCA2 mesal coxal apodeme leg II.

16. Extent of sclerotization of coxae III and IV: Weakly sclerotized--margin of coxa merges with integument; strongly sclerotized--margin of coxa distinct.

17. Direction of cuticular striation: Longitudinal--in the direction of the meson; transverse--in a lateral direction; completely transverse--at least one striation connecting left pleuron to right pleuron; incompletely transverse--striations curved toward meson.

Legs - characters 18-21

Each leg consists of coxa, trochanter, femur, genu, tibia, tarsus, and pretarsus. Although the shape of the segments may vary, segments are never subdivided or lost. The chaetotaxy of the legs (Fig. 7, Table I), is stable for a given genus and affords a very useful character. Grandjean's (1944), chaetotaxal signatures for stigmaeids has been applied in the current study with only minor modifications.

18. Thickness of legs: Relative thickness of legs as contrasted with each other from the femur to pretarsus.

19. Leg chaetotaxy: Full complement of setae--sc1, sc2, dFII, dFIII, dFIV, dGII, dTIII, dTIV, vs 'I, vs "II present; reduced--any or all of the foregoing setae absent; supernumerary--vsIII present.

20. Condition of a', a" (fan setae): multiserrate--distal tip expanded, bearing four or more regularly spaced serrations (Fig. 32 C); rod-like--distal tip not expanded, but rounded, and of uniform diameter throughout (Fig. 37 D); irregularly serrate--distal tip bearing three or fewer irregularly spaced serrations (Fig. 37 E).

21. Condition of claws: paraxial and antaxial members sub-equal; paraxial and antaxial members dissimilar (Fig. 37 C); recurved--distal portion of claw curved back toward basal portion, basal portion enlarged (Fig. 20 C); broadly curved--"C" shaped, distal portion not reflected upon basal portion, basal portion not enlarged (Fig. 18 C); with basal angle--basal portion of claw forming a right angle to curvature of the main body of claw (Fig. 25 C); relative length of claws--length of claws as a fraction of the length of the empodium.

In the generic descriptions, the characteristic number, i.e., (1)., (2)., (3)., etc. is underlined for distinctive characters for that genus.

TABLE I

Leg chaetotaxy of
Syringophilus bipectinatus Heller adults
 (Adapted from Grandjean, 1944)

Segment	Number of setae	Setal signature
Coxae I-IV	3, 1, 3, 2	<u>1a</u> , <u>1b</u> , <u>1c</u> , <u>2b</u> , <u>3a</u> , <u>3b</u> , <u>3c</u> , <u>4b</u> , <u>4c</u> .
Trochanters I-IV	1, 1, 1, 1	<u>sc1</u> , <u>sc2</u> , <u>sc3</u> , <u>sc4</u> .
Femur I	2	<u>dF</u> , <u>vF</u> .
II	2	<u>dF</u> , <u>vF</u> .
III	1	<u>dF</u> .
IV	1	<u>dF</u> .
Genu I	3	<u>dG</u> , <u>lG</u> , <u>sigma</u> .
II	2	<u>dG</u> , <u>lG</u> .
III	1	<u>lG</u> ".
IV	1	<u>lG</u> ".
Tibia I	5	<u>dT</u> , <u>vT</u> , <u>lT'</u> , <u>lT</u> ", <u>phi</u> .
II	4	<u>dT</u> , <u>vT</u> , <u>lT'</u> , <u>lT</u> ".
III	3	<u>dT</u> , <u>vT</u> , <u>lT</u> ".
IV	3	<u>dT</u> , <u>vT</u> , <u>lT</u> ".
Tarsus		
I	11	<u>u'</u> , <u>u</u> ", <u>vs'</u> , <u>ft</u> , <u>TC'</u> , <u>TC</u> ", <u>P'</u> , <u>P</u> ", <u>a'</u> , <u>a</u> ", <u>omega</u> .
II	8	<u>u'</u> , <u>u</u> ", <u>vs'</u> , <u>tc'</u> , <u>tc</u> ", <u>a'</u> , <u>a</u> ", <u>omega</u> .
III	6	<u>u'</u> , <u>u</u> ", <u>tc'</u> , <u>tc</u> ", <u>a'</u> , <u>a</u> ".
IV	6	<u>u'</u> , <u>u</u> ", <u>tc'</u> , <u>tc</u> ", <u>a'</u> , <u>a</u> ".

' denotes paraxial position.

" denotes antaxial position.

Solenidia included in total setal count per segment.

Complete uppercase lettering denotes eupathids.

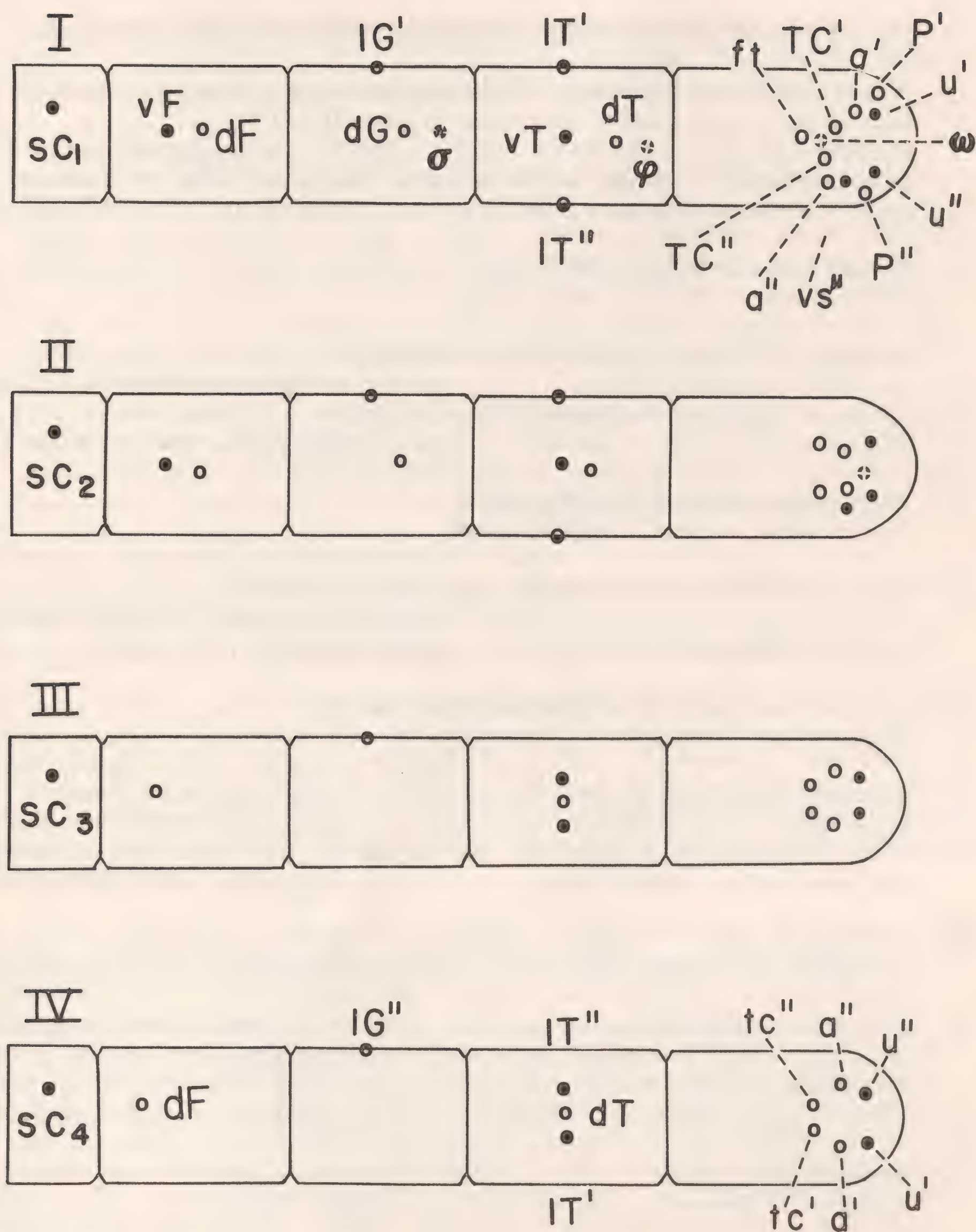


Fig. 7. Schematic dorsal aspects of legs I-IV. Dorsal tactile setae represented by open circles, dorsal solenidia by incomplete circles, ventral tactile setae by solid black circles.

KEY TO THE GENERA OF SYRINGOPHILIDAE BASED ON ADULT FEMALES

1. Palpal tibiotarsus truncate on distal margin; setae a' and a'' of tarsi not multiserrate; legs I and II dissimilar to legs III and IV Picobia Haller, p. 64.
Palpal tibiotarsus rounded on distal margin; setae a' and a'' of tarsi with at least four serrations; legs I and II similar to legs III and IV.....2.
2. Dorsal setae of femur II (dFII) absent 3.
Dorsal setae of femur II (dFII) present 4.
3. Setae vs'II absent; vi absent; Columbiformes Peristerophila, new genus, p. 53.
Setae vs'II present; vi present; Charadriiformes Ascetomylla, new genus, p. 24.
4. Dorsal setae of genu II (dGII) absent 5.
Dorsal setae of genu II (dGII) present 6.
5. Setae vs'I absent; Pelecaniformes and Charadriiformes Philoxanthornea, new genus, p. 50.
Setae vs'I present; Passeriformes ... Syringophiloidus, new genus, p. 48.
6. At least four pairs of paragenital setae present 7.
No more than three pairs of paragenital setae present..... 8.
7. Setae vs'III present; at least seven pairs of paragenital setae present; large mites; Ciconiformes..... Trypetoptila, new genus, p. 25.
Setae vs'III absent; at most five pairs of paragenital setae present; moderate sized mites; Passeriformes..... Torotroglia, new genus, p. 28.
8. One pair of anal or one pair of genital setae absent 9.
Two pairs of anal setae present and two pairs of genital setae present . 10.
9. One pair of genital setae present; two pairs of anal setae present; vs'II absent; vi present; Procellariiformes..... Syringonomus, new genus, p. 56.
Two pairs of genital setae present; one pair of anal setae present; vs'II present; vi absent; Passeriformes..... Aulonastus, new genus, p. 47.
10. Setae vs'II absent.11.
Setae vs' II present12.
11. Lateral hypostomal teeth present; propodosomal setae 2-2-2; Coraciiformes Stibarokris, new genus, p. 62.
Lateral hypostomal teeth absent; propodosomal setae 2-1-1-2..... Niglarobia, new genus, p. 43.
12. Setae l2, d3, l3, d5, long13.
Setae l2, d3, l3, d5, short; Anseriformes..... Chenophila, new genus, p. 37.

13. Mesal coxal apodemes of legs I (MCA1) parallel; Passeriformes
Aulobia, new genus, p. 41.
 Mesal coxal apodemes of legs I (MCA1) divergent, not parallel14.
14. Mesal coxal apodemes of legs I (MCA1) dissimilar in size and shape of
 mesal coxal apodeme of legs II (MCA2); claws at most 1/3 length of
 empodium15.
 Mesal coxal apodemes of legs I (MCA1) similar in size and shape to mesal
 coxal apodeme of legs II (MCA2); claws at least 1/2 length of empodium 16.
15. Hypostomal apex unornamented; mesal coxal apodeme I (MCA1) fused to
 mesal coxal apodeme II (MCA2) at posterior base of MCA2; d2 usually
 closer to l2 than to d3; Galliformes.....Syringophilus Heller, p. 17.
 Hypostomal apex ornamented; mesal coxal apodeme I (MCA1) fused to mesal
 coxal apodeme II (MCA2) at anterior 1/2 length of MCA2; d2 usually closer
 to d3 than to l2, but may be equidistant between l2 and d3; Passeriformes.
Syringophilopsis, new genus, p. 18.
16. Claws recurved; d5 short; Charadriiformes
Creagonycha, new genus, p. 34.
 Claws broadly open; d5 long; Charadriiformes
Selenonycha, new genus, p. 31.

Genus Syringophilus Heller

Syringophilus Heller, 1880, Die Schmarotzer, 186 - Oudemans, 1906, Mem.

Soc. zool. Paris, 19:43-46. - Hering, 1934, L'Amateur de Papillons, Paris, 7, 154 (Hymenoptera: Insecta, not Acari). - Dubinin, 1957, Mag. Parasitol. Inst. Zool. Akad. Sc. USSR., 17:71-136. - Fritsch, 1958, Zool. Jahrbucher 86:227-229.

Within the group of genera having MCA1 weakly divergent and fused to MCA2 (Syringophilus, Syringophilopsis, Ascetomylla, and Trypetoptila) Syringophilus is distinguished by the configuration of the lateral branches of the peritreme, and the location of setae d3 closer to l2 than to l3. This genus appears most similar to Syringophilopsis. These large mites (920 μ - 1100 μ) are found in the flight feathers of galliform birds of the families Phasianidae and Numididae.

Type species: Syringophilus bipectinatus Heller, 1880, Die Schmarotzer, p. 186, (by original designation); ex. Gallus gallus (L.); Phasianidae, Galliformes.

FEMALE. (1). Hypostomal apex smooth. (2). Lateral hypostomal teeth absent. (3). Chelicerae dentate, 1-2 small teeth. (4). Lateral branches of peritreme displaced into U shape, (Fig. 8 C), with 2-3 chambers; each longitudinal branch with 8-10 chambers. (5). Posterior margin of stylophore pointed, extending beneath propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate weakly sclerotized; lateral margins parallel; anterior and posterior margins concave. (9). Hysterosomal plate absent. (10). Setal pattern of propodosomal region with six pairs of setae arranged 3-1-2. (11). Setae l2, d3, l3 long; d3 closer to l2 than to l3. (12). Setae d4, l4 long; d5, l5 short. (13). Genital series with two pairs of setae; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 weakly divergent fused to MCA2 at posterior base of MCA2. (16). Coxae III and IV subequal, crescent shaped, weakly sclerotized, margins indistinct. (17). Cuticular striations as in Fig. 14 A, B. (18). Legs

I and II thicker than III and IV. (19). Legs with full complement of setae. (20). Setae a' and a'' multiserrate, 6-15 times. (21). Antaxial and paraxial members of claw pair subequal; claws $1/3$ to $1/4$ length of empodium. (22). Order of hosts: Galliformes. (23). Types of feathers inhabit: unknown.

MALE. As in female except: (3). Chelicerae edentate. (10). Setal pattern of propodosomal region 3-1-2, all setae on plate. (11). Setae d3, l3 short. (12). Setae d4 short. (14). Paragenital series with two pairs of setae; pg1 absent, pg3 terminal.

Remarks. In addition to the type species, material representing one unnamed species was studied in an evaluation of the generic characters.

Syringophilus bipectinatus Heller

(Figs. 8, 9)

Only the pertinent citations of this species are given.

Syringophilus bipectinatus Heller, 1880, Die Schmarotzer, 186. - Oudemans, 1906, Mem. Soc. zool. Paris, 19:47-57. - Baker and Wharton, 1952, An introduction to acarology, 229-231. - Lavoipierre, 1953, Trans. Roy. Soc. Trop. Med. Hyg. 47:7. - Dubinin, 1957, Mag. Parasitol. Inst. Zool. Akad. Sc. USSR., 17:71-136. - Fritsch, 1958, Zool. Jahrbucher 86:229-230. - Clark, 1964, Acarologia 6:77.

Although all type material is lost, 16 specimens on loan from the British Museum (Natural History), adjudged to be conspecific were examined by the author. Described originally from Gallus gallus (L.), (Galliformes: Phasianidae), in Europe, this species has been collected from the same host in Ndumu, Zululand. and from Kansas and Colorado in the United States. Numerous records of this mite appear in the literature from different hosts, but only the above listed reports have been confirmed by the author.

Syringophilopsis, new genus

Within the previously mentioned group of genera having MCA1 fused to MCA2, species of Syringophilopsis may be distinguished by the shape of the lateral branches of the peritreme, the location of d3 closer to l3 than l2, and the presence of the full complement of leg setae. This genus appears most similar to Syringophilus. These large mites (950μ - 1360μ) are found in the primaries of passeriform birds of the following families: Aludidae, Fringillidae, Hirundinidae, Icteridae, Parulidae, Pycnonotidae, Turdidae, Tyrannidae, and Vireonidae. The name Syringophilopsis (masculine singular) means having the appearance of syringophilus, and refers to the similarity of the two genera.

Type species: Syringophilus elongatus Ewing, 1911. Psyche, Boston 18, 39.

FEMALE. (1). Hypostomal apex highly ornamented; 2-3 paired median protuberances. (2). Lateral hypostomal teeth absent. (3). Chelicerae dentate, 1-3 teeth. (4). Peritreme M-shaped; longitudinal branches each with 14-20 chambers; lateral branches each with 2-6 chambers. (5). Stylophore rounded posteriorly; not extending beneath propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate divided or deeply cleft on anterior margin. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with six pairs of setae arranged 3-1-2; l1 not on plate, variable position. (11). Setae l2, d3, l3 long; d3 closer to l3 than l2, or equidistant between l2 and l3. (12). Setae d4, d5 long; l4, l5

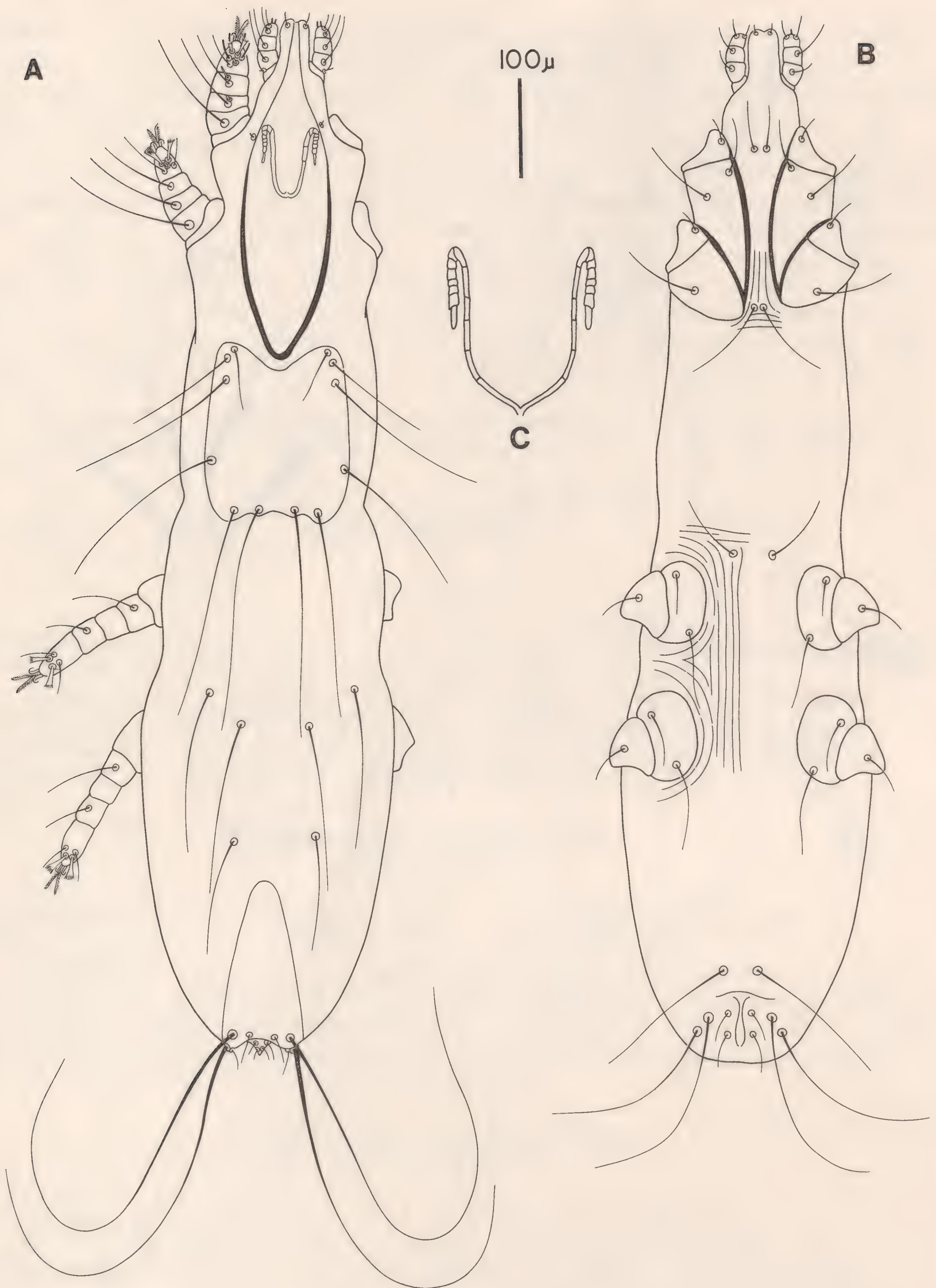


Fig. 8. *Syringophilus bipectinatus* Heller. Female: A, dorsal aspect; B, ventral aspect; C, peritreme.

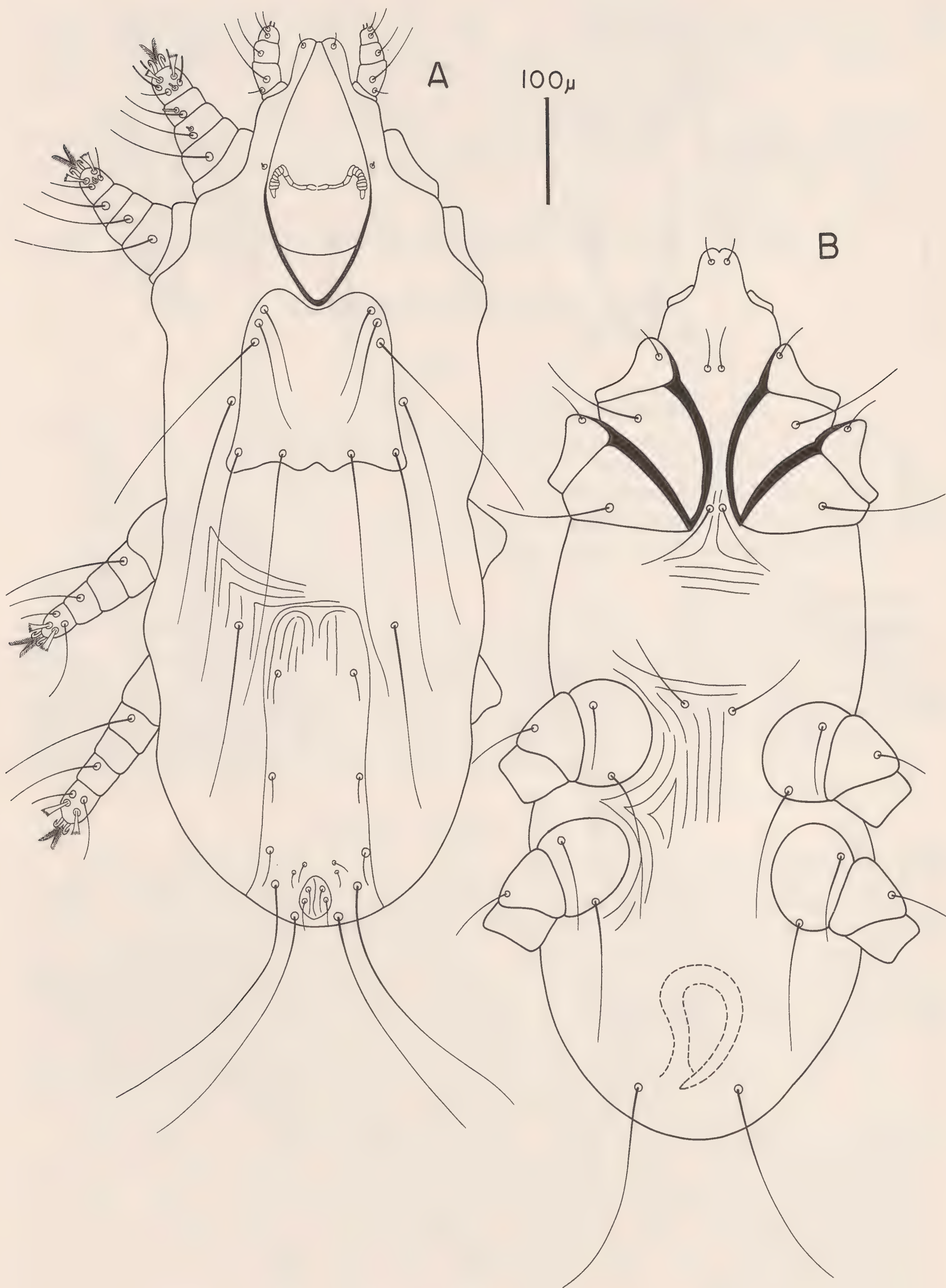


Fig. 9. Syringophilus bipectinatus Heller, Male: A, dorsal aspect; B, ventral aspect.

variable. (13). Genital series with 2 pairs of setae; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 divergent, fused to MCA2 at anterior 1/2 length of MCA2. (16). Coxae III and IV moderately sclerotized, rectangular in shape. (17). Cuticular striations as in Fig. 10 A, B. (18). Legs I-IV subequal in thickness. (19). Legs with full complement of setae. (20). Setae a' and a'' multiserrate, 12-20 times. (21). Antaxial and paraxial members of claw pair subequal; claws 1/3 length of empodium. (22). Order of hosts: Passeriformes. (23). Types of feathers inhabit: primaries.

MALE. As in female except: (1). Hypostome without hyaline lips. (3). Chelicerae edentate. (8). Propodosomal plate very weakly sclerotized, margins indistinct. (9). Hysterosomal plate absent. (10). Setal pattern of propodosomal region obscured, difficult to characterize. (11). Setae l3, d3 short. (12). Setae l4 long; d4, d5, l5 short. (17). Cuticular striation patterns as in Fig. 11 A, B.

The genus Syringophilopsis includes five named and sixteen new species. The named species to be transferred to this genus are:

Syringophilopsis elongatus (Ewing)
new combination

(Figs. 10, 11)

Syringophilus elongatus Ewing, 1911, Psyche, 18, p. 39. Syringophilus icteridae Clark, 1964, Acarologia 6: 89, Figs. 30, 31.

Although all type material is lost, 50 specimens on loan from the Rocky Mountain Laboratory, from the type host, adjudged conspecific were studied. Described originally from Agelaius phoeniceus (L.) (Passeriformes: Icteridae) this species has been collected in Maryland and Georgia, U. S. A.

Syringophilopsis fringilla (Fritsch)
new combination

Syringophilus fringillae Fritsch, 1958, Zool. Jahrbucher 86 (3):230-233, Figs. 2, 3.

Although all type material is lost, 3 specimens on loan from C. D. Radford and J. Gaud from the type host were adjudged conspecific. Described originally from Fringilla coelebs (L.) (Passeriformes: Fringillidae) in Germany, this species has been collected from the same host in England and from Carduelis carduelis (L.) (Passeriformes: Fringillidae) in Morocco.

Syringophilopsis hylocichla (Clark)
new combination

Syringophilus hylocichlae Clark, 1964, Acarologia 6: 87, Figs. 28, 29.

Although the holotype is lost, 2 paratypes on loan from the Rocky Mountain Laboratory were examined. Described originally from Hylocichla fuscescens (Stephans) (Passeriformes: Turdidae) from the United States, this species has not been recollected.

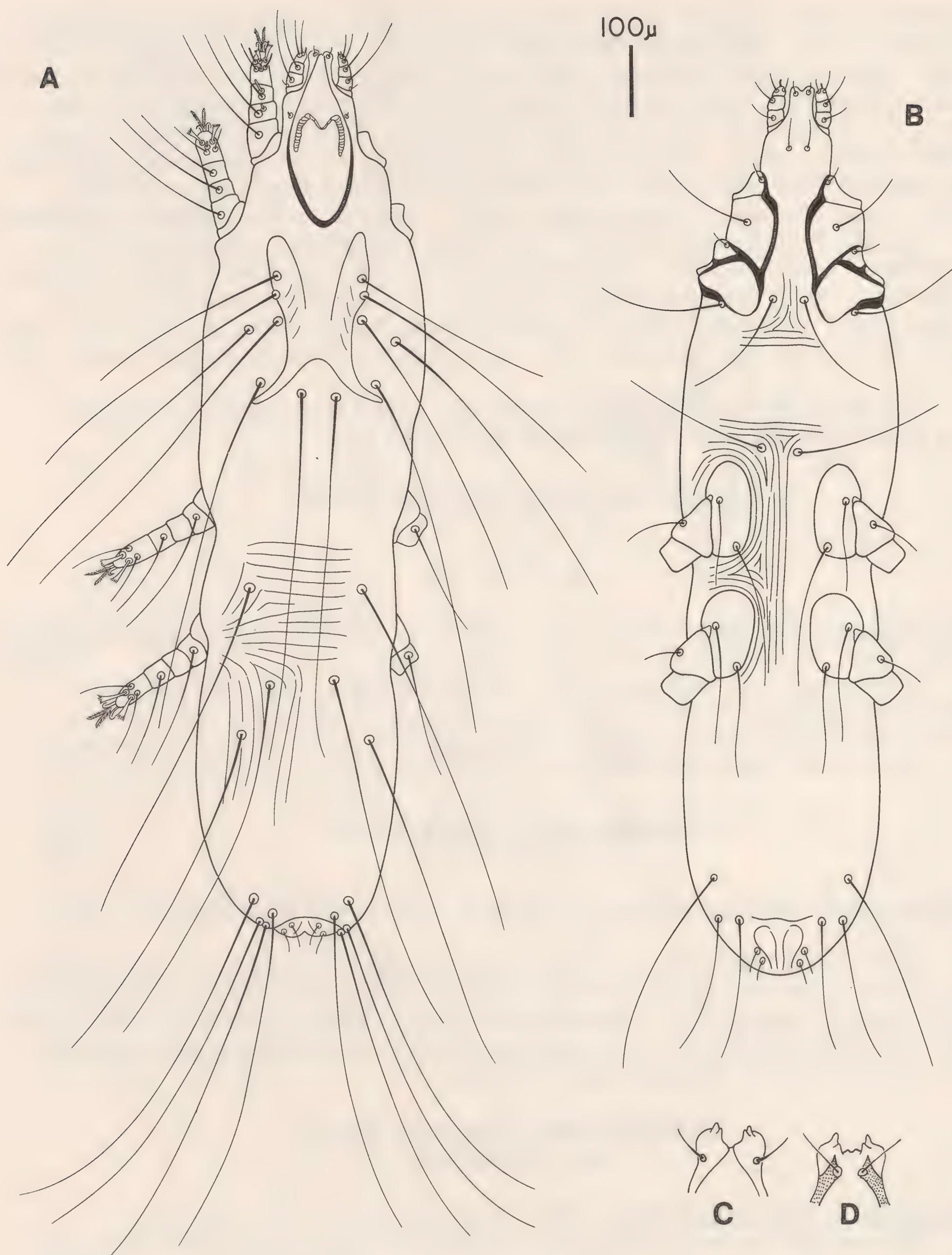


Fig. 10. *Syringophilopsis elongatus* (Ewing). Female: A, dorsal aspect; B, ventral aspect; C, hypostomal lips, dorsal aspect; D, hypostomal lips, ventral aspect.

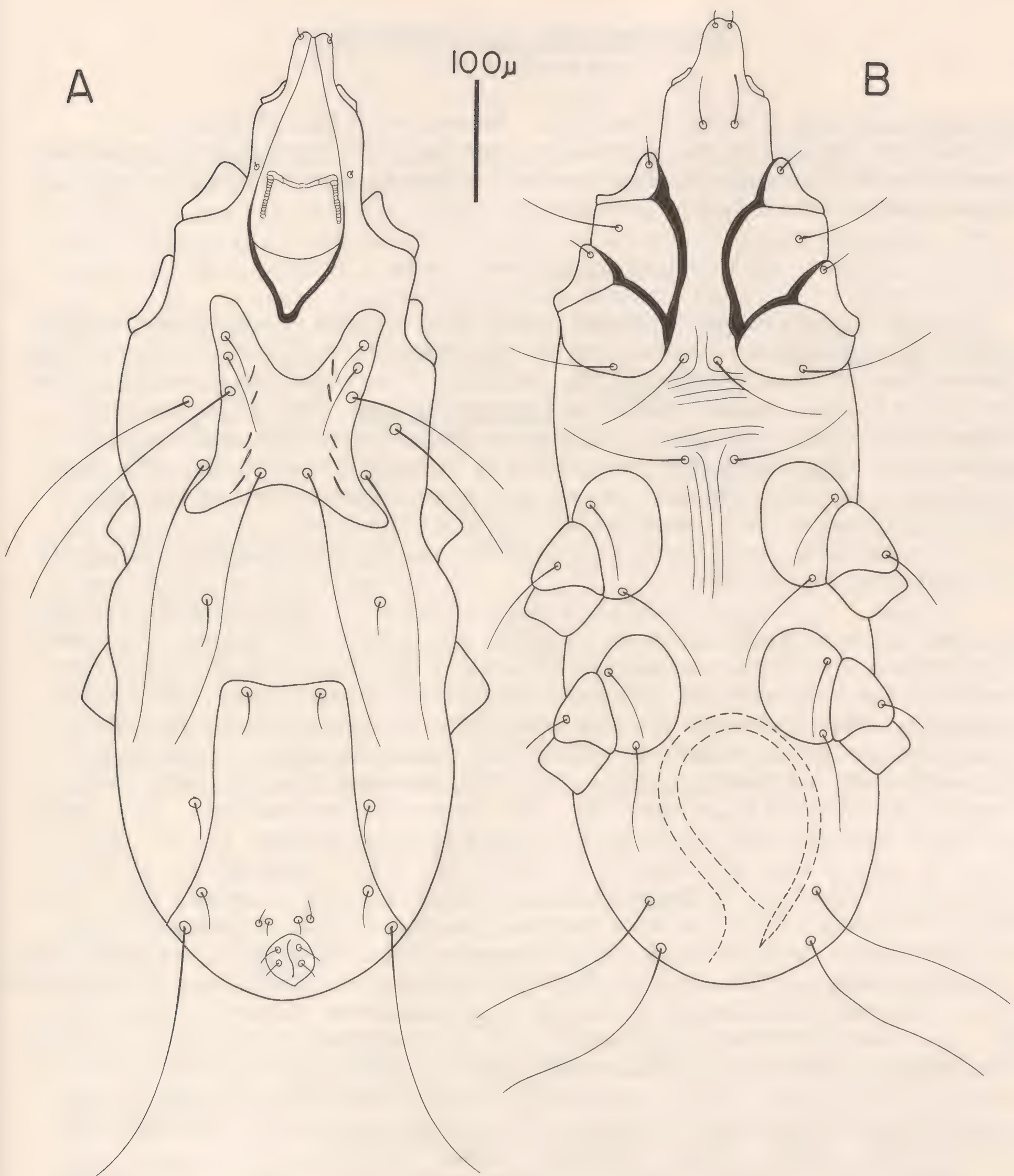


Fig. 11. Syringophilopsis elongatus (Ewing). Male: A, dorsal aspect; B, ventral aspect.

Syringophilopsis passerina (Clark)
new combination

Syringophilus passerinae Clark, 1964, *Acarologia* 6: 91 Figs. 26, 27.

Although the holotype is lost, 1 paratype on loan from the Rocky Mountain Laboratory was examined. Described originally from Passerina cyanea (L.) from Maryland, this species has been collected from the same host in Florida, U.S.A.

Syringophilopsis turdus (Fritsch)
new combination

Syringophilus turdi Fritsch, 1958, Zool. Jahrbucher 86(3):233-235, Fig. 4.

All type material of this species is destroyed, and representative specimens were not available for study. The type host of this species is Turdus pilaris (L.) (Passeriformes: Turdidae) in Germany.

Ascetomylla, new genus

Among the previously mentioned genera having MCA1 divergent and fused to MCA2, Ascetomylla is distinguished by the configuration of the hypostomal lips and the loss of leg setae dFII, dFIII, and dFIV. Based upon the epimerites, this new genus appears closely related to Syringophilopsis. These large to very large mites (1200 μ - 1340 μ) are found in the flight feathers of gruiform birds of the family Rallidae, and coraciiform birds of the family Bucerotidae. The name Ascetomylla (feminine singular) means ornamented lip and refers to the highly ornate condition of the hypostomal lips of the adult female.

Type species: Ascetomylla gallinula new species, ex. Gallinula chloropus (L.); Rallidae, Gruiformes.

FEMALE. (1). Hypostomal apex highly ornamented, two fingerlike and two rounded, paired protuberances present (Fig. 12 C, D). (2). Lateral hypostomal teeth absent. (3). Chelicerae with 2-3 teeth. (4). Peritreme M-shaped; lateral branches each with 3-5 chambers; longitudinal branches each with 16-24 chambers. (5). Stylophore rounded posteriorly, to weakly constricted; not extending beneath propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate divided; lateral margins concave and scalloped. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with six pairs of setae arranged 3-1-2. (11). Setae 12, d3, 13 long; d3 closer to 13 than to 12. (12). Setae d4, 14, 15 long; subequal; d5 short; 14, 15 borne on common tubercle. (13). Genital series with 2 pairs of setae; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 divergent, fused to MCA2 at anterior 1/3 to 1/2 length of Ep2. (16). Coxae III and IV weakly sclerotized, margins indistinct. (17). Cuticular striations as in Fig. 12 A, B; transverse between coxae III and IV. (18). Legs I slightly thicker than II; legs II subequal in thickness to III and IV. (19). Leg setae dFII, dFIII and dFIV absent. (20). Setae a' and a'' multiserrate, 16-24 times. (21). Antaxial and paraxial members of claw pair subequal; claws 1/2 length of empodium. (22). Orders of hosts: Gruiformes and Coraciiformes. (23). Types of feathers inhabit: unknown.

MALE. As in female except: (1). Hypostomal lips lacking. (8). Sclerotization present in region of setal bases vi, ve only. (9). Hysterosomal plate absent. (10). Setal pattern of propodosomal region obscure. (11). Setae 12, d3, 13 short. (12). Seta 14 long; d4, d5, 15 short. (17). Cuticular striations as in Fig. 13 A, B. (21). Claws 1/3 length of empodium.

Remarks. In addition to the type species, material representing three unnamed species was studied in an evaluation of the generic characters.

Ascetomylla gallinula, new species

(Figs. 12, 13)

FEMALE (holotype). Length 1380 μ ; width 345 μ . Gnathosoma: Hypostomal apices (Fig. 12 C, D), highly ornate, seven pairs of processes, of which the outer three pairs are longest. Peritremes with each lateral branch three chambered; each longitudinal branch with 18-19 chambers. Dorsal idiosoma: Propodosomal plate divided, bearing setae vi, ve; ratios of vi:ve:sci:sce, 1:3:3:4; sci, d1, l1 subequal. Hysterosomal plate absent; l2, d3, l3 subequal to sce; ratios of d4:l4:d5:l5, 8:8:1:8; d4 1 1/2 times length of d1. Ventral idiosoma: As in Fig. 12 B. Legs: Setae dF, dG, dT of legs I and II smooth; a' and a'' I-IV each with 15-16 times, a'I 1/2 length of a''I; sc3 and sc4 subequal, not extending beyond genua; vFII extending at least to ambulacrum.

MALE (paratype). Length 980 μ ; width 320 μ . Gnathosoma: Hypostomal apices unornamented. Peritremes as in female. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, d1; ratios of vi:ve:sci:sce, 1:1:1:2; l1 2/3 length of sce; d1 subequal to sce. Hysterosomal plate absent; l2, d3, l3 subequal, 1/2 length of vi; ratios of d4:l4:g1:g2, 2:6:1:1; d4 subequal to vi. Ventral idiosoma and aedeagus: As in Fig. 13 B. Legs: As in female except a'I subequal to a''I.

Type material. From Gallinula chloropus (L.), Rallidae: holotype female; 2 male and 2 female paratypes Johannesburg, Transvaal, Union of South Africa; February 9, 1954; J. Gaud. The holotype and one paratype male and one paratype female are deposited with the South African Institute for Medical Research. The remaining paratypes are deposited with the Entomology Department, University of Georgia, Athens, Georgia. The name gallinula refers to the host.

Trypetoptila, new genus

This new genus appears most similar to Syringophilopsis. Species of Trypetoptila may be distinguished by the presence of 3-6 additional pairs of setae in the paragenital series, and the presence of leg setae vs'III. These very large mites (1520 μ - 1880 μ) are found in the covert feathers of ciconiiform birds of the family Ardeidae. The name Trypetoptila (feminine singular) means feather borer and refers to the hole found in the quills inhabited by the mite.

Type species: Trypetoptila casmerodia, new species, ex. Casmerodius albus egretta (Ord); Ardeidae, Ciconiiformes.

FEMALE. (1). Hypostomal apex ornamented; rounded protuberances present. (2). Lateral hypostomal teeth absent. (3). Chelicerae dentate, 2-3 teeth. (4). Peritreme M shaped; lateral branches each with 2-3 chambers, longitudinal branches each with 8-10 chambers. (5). Stylophore rounded posteriorly, not extending below propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate cleft; lateral margin concave. (9). Hysterosomal plate absent. (10). Setal pattern of propodosomal region with six pairs of setae arranged 3-1-2. (11). Setae l2, d3, l3 long; d3 closer to l2 than to l3. (12). Setae d4, l4, d5, l5 long. (13). Genital series with two pairs of setae; anal series with two pairs of setae. (14). Paragenital series supernumerary; 6-9 pairs of setae present. (15). MCA1 divergent, fused to MCA2 at anterior 1/3 to 1/2 length of MCA2. (16). Coxae III and IV weakly sclerotized, margins indistinct. (17). Cuticular striations as in Fig. 14 A, B. (18). Legs I-IV subequal in thickness. (19). Legs with supernumerary setal

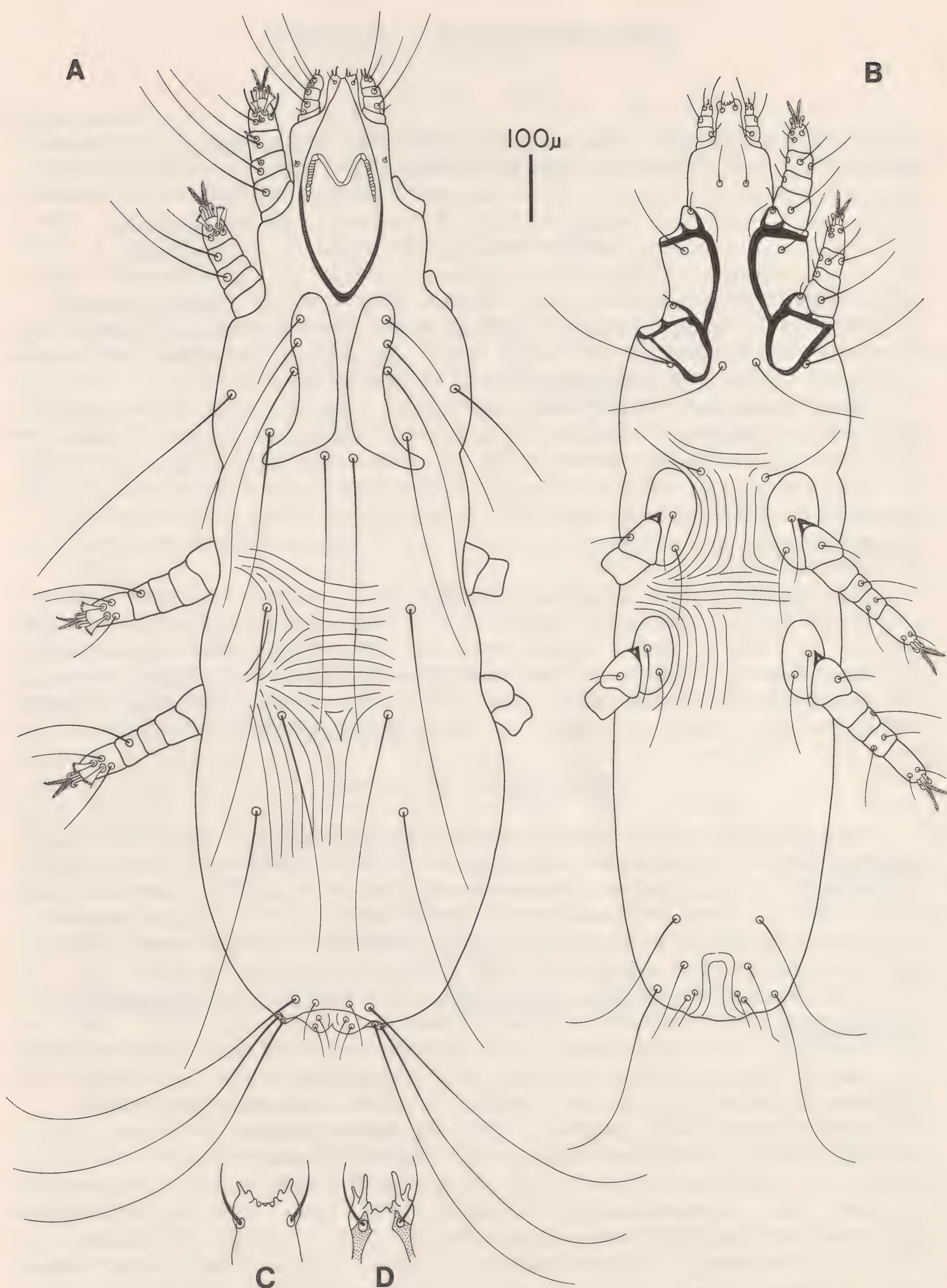


Fig. 12. Ascetomylla gallinula new species. Female (holotype): A, dorsal aspect; B, ventral aspect; C, hypostomal lips, dorsal aspect; D, hypostomal lips, ventral aspect.

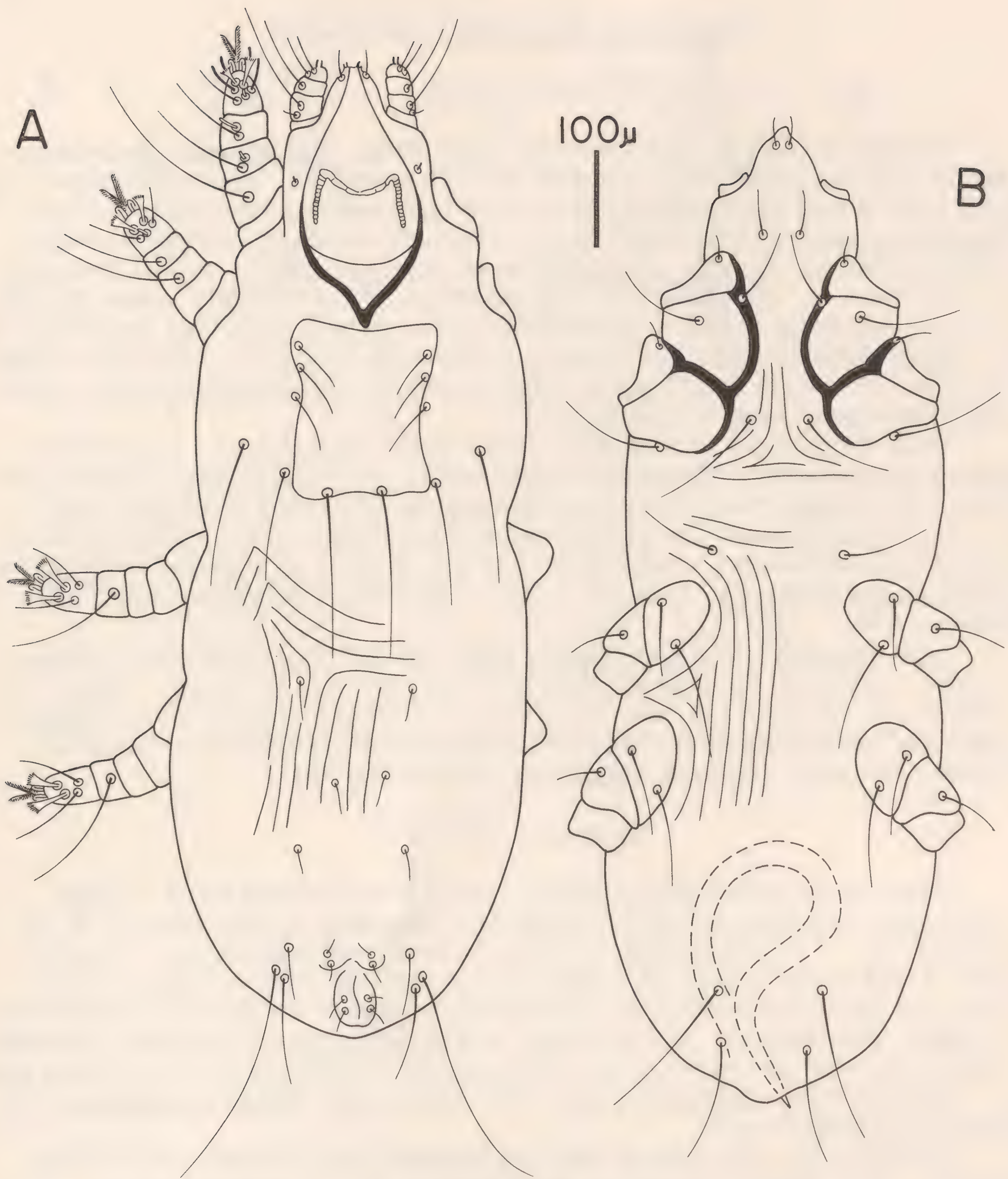


Fig. 13. Ascetomylla gallinula new species. Male (paratype): A, dorsal aspect; B, ventral aspect.

condition, vs'III present. (20). Setae a' and a" multiserrate, 24-28 tines. (21). Antaxial and paraxial members of claw pair subequal with basal angles; claws of equal length as empodium. (22). Order of host: Ciconiiformes. (23). Types of feathers inhabit: secondaries and coverts.

MALE. As in female except: (1). Hypostomal lips absent. (3). Chelicerae edentate. (8). Propodosomal plate weakly sclerotized, margins indistinct. (10). Setal pattern of propodosomal region 3-2-1. (11). Setae d3, l3 short. (12). Setae d4, d5, l5 short. (14). Paragenital series supernumerary, with 5-6 pairs of setae present. (17). Cuticular striations as in Fig. 15 A, B. (21). Claws 1/3 length of empodium.

Trypetoptila casmerodia, new species

(Figs. 14, 15)

FEMALE (holotype). Length 1880μ ; width 320μ . Gnathosoma: Hypostomal apices slightly ornamented, two pairs of blunt processes. Peritremes (Fig. 14 C), with each lateral branch 3 chambered; each longitudinal branch 8 chambered. Dorsal idiosoma: Propodosomal plate not divided, concave on posterior margin, bearing setae vi, ve, sci, d1, l1; ratios of vi:ve:sci:sce, $1:1:1\frac{1}{4}:1\frac{1}{4}$; sce, d1, l1 subequal. Hysterosomal plate absent; l2, d3, l3 slightly longer than d1; ratio of d4:l4:d5:l5, $1:1:1:1$; d4 subequal to d1. Ventral idiosoma: As in Fig. 14 B. Legs: Setae dF, dG, dT of legs I, II smooth; a' and a'' I-IV with 22-26 tines each, a'I $\frac{1}{2}$ length of a''I; sc3 and sc4 subequal, not extending beyond genua; vFII extending at least to ambulacrum.

MALE (paratype). Length 1260μ ; width 410μ . Gnathosoma: Hypostomal apices unornamented. Peritremes as in female. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, d1, l1; ratios of vi:ve:sci:sce, $1:1:1\frac{1}{2}:2$; sci subequal to d1, l1. Hysterosomal plate absent; l2 subequal to sce; d3, l3 $\frac{1}{2}$ length l2; ratio of d4:l4:g1:g2, $3:6:1:1$; d4 subequal to d3. Ventral idiosoma and aedeagus: As in Fig. 15 B. Legs: As in female except a'I subequal to a''II.

Type material. From Casmerodius albus egretta (Ord), Ardeidae; holotype female, 7 male and 18 female paratypes, McIntosh County, Georgia, March 19, 1969; W. T. Atyeo, C. W. Proctor, and J. B. Kethley. The holotype and paratypes are deposited with the Entomology Department, University of Georgia, Athens, Georgia. The name casmerodia refers to the host.

Torotrogla, new genus

Among those genera having MCA1 strongly divergent and fused to MCA2 (Torotrogla, Selenonycha and Creagonycha), Torotrogla is distinguished by the presence of 1-3 additional pairs of setae in the paragenital series. The affinities of this new genus are uncertain. These medium sized to large mites (640μ - 890μ) are found in the primaries of passeriform birds of the families Fringillidae, Mimidae, Ptilgonatidae, and Turdidae. The name Torotrogla (feminine, singular) means hole borer and refers to the hole found in the feathers inhabited by the mites.

Type species: Torotrogla mima, new species, ex. Mimus polyglottos (L.); Mimidae, Passeriformes.

FEMALE. (1). Hypostomal apex ornamented; paired median protuberance present. (2). Lateral hypostomal teeth absent. (3). Chelicerae dentate, 2-3 teeth. (4). Peritreme M shaped; each lateral branch with 2-3 chambers; each longitudinal branch with 4-12 chambers. (5). Stylophore rounded posteriorly, not extending beneath propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate variable, weakly sclerotized; usually rectangular. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with six pairs of setae arranged 3-2-1. (11). Setae l2, d3, l3 long; d3 closer to l3 than to l2. (12). Setae d4, l4 long, d5, l5 short. (13). Genital series with two pairs of setae; anal series with two pairs of setae. (14). Paragenital series supernumerary; 4-6 pairs of setae present. (15). MCA1 strongly divergent, fused to MCA2 at basal $\frac{1}{2}$ length of MCA2. (16). Coxae III and IV weakly sclerotized, margins indistinct. (17). Cuticular striations as in Fig. 16 A, B. (18). Legs I slightly thicker than II; legs II - IV subequal in

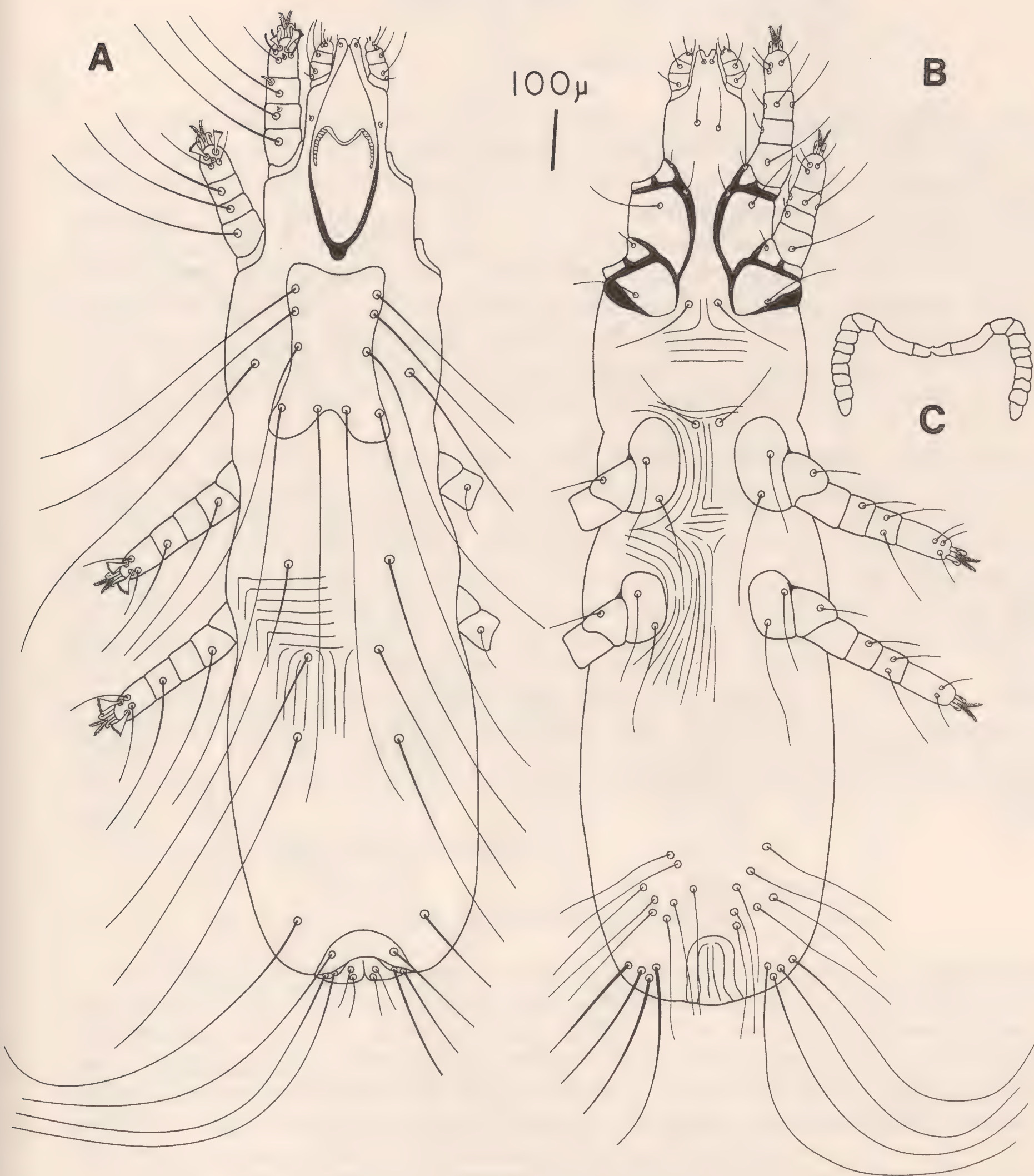


Fig. 14. *Trypetoptila casmerodia* new species. Female (holotype): A, dorsal aspect; B, ventral aspect; C. peritreme.

thickness. (19). Legs with full complement of setae. (20). Setae a' and a'' multiserrate, 10-20 tines. (21). Antaxial and paraxial members of claw pair subequal; claws extending 1/5 length of empodium. (22). Order of hosts: Passeriformes. (23). Types of feathers inhabit: primaries.

MALE. As in the female except: (1). Hypostomal lips absent. (2). Chelicerae edentate. (5). Stylophore rounded posteriorly or constricted. (11). Setae l2, d3, l3 short. (12). Setae d4 short. (14). Paragenital series with 3-4 pairs of setae. (17). Cuticular striations as in Fig. 17 A, B. (21). Claws 1/3 length of empodium.

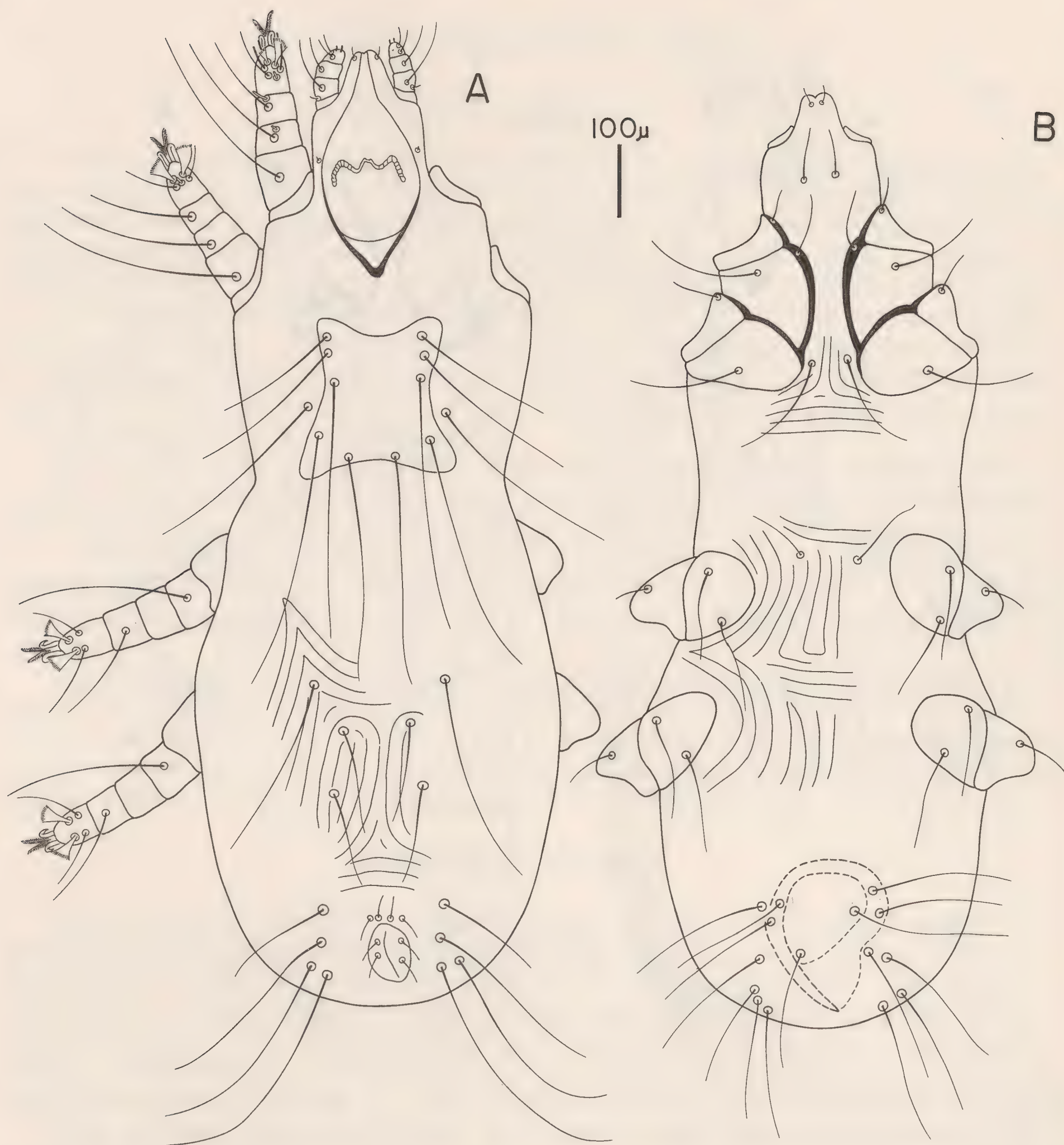


Fig. 15. Trypetoptila casmerodia new species. Male (paratype): A, dorsal aspect; B, ventral aspect.

The genus Torotrogla includes one named and 5 new species:

Torotrogla villosa (Hancock)
new combination

Picobia villosa Hancock, 1895, Amer. Nat. 29:382-384, Fig. 1,2.

All type material of this species is lost. Originally described from Phainopepla nitens (Swainson) (Passeriformes: Ptilgonatidae) in Arizona, this species has not been recollected.

Torotrogla mima, new species

(Figs. 16. 17)

FEMALE (holotype). Length 890 μ ; width 300 μ . Gnathosoma: Hypostomal apices ornamented, with paired median protuberances. Peritremes (Fig. 16 C), each lateral branch 3 chambered; each longitudinal branch 6 chambered. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, dl; ratios of vi:ve:sci:sce, 1:1 1/2:3:4; sce, dl, ll subequal in length. Hysterosomal plate absent; l2, l3 subequal in length to dl; d3 three times length of vi; ratios of d4:l4:d5:l5, 7:7:1:1; d4 two times length of dl. Ventral idiosoma: As in Fig. 16 B. Legs: Setae dF, dG, dT of legs I and II smooth; a' and a'' I-IV each with 16-17 tines, a'I 2/3 length of a''I; sc3 and sc4 subequal, extending beyond genua; vFII extending at least to ambulacrum; tc'III and IV each subequal to tc''III and IV.

MALE (paratype). Length 740 μ ; width 280 μ . Gnathosoma: Hypostomal apices unornamented. Peritremes as in female. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, dl; ratios of vi:ve:sci:sce, 1:1:3:4; dl, ll four times length of vi. Hysterosomal plate present and continuous with pygidial plate, bearing setae d3, d4, l4, d5, l5; l2, d3, l3, vi subequal in length; ratios of d4:l4:g1:g2, 2:10:1:1; d4 subequal to sci; pg 3 dorsal. Ventral idiosoma and aedeagus: As in Fig. 17 B. Legs: As in female except a'I subequal to a''I; sc3 and sc4 not extending beyond genua.

Type material. From Mimus polyglottos (L.), Mimidae: holotype female, thirty female and fourteen male paratypes, one mile N. W. Odum, Wayne County, Georgia, March 20, 1969, W. T. Atyeo, C. W. Proctor, J. B. Kethley. Holotype, fifteen female and seven male paratypes deposited with the University of Georgia, Athens, Georgia.

The name mima refers to the host.

Selenonycha, new genus

Within the group of genera having MCA1 strongly divergent, Selenonycha is distinguished by the broadly open shape of the claws of the adult female and the presence of three pairs of paragenital setae. This new genus appears most similar to Creagonycha. These large mites (930 μ - 1360 μ) are found in the flight feathers of charadriiform birds of the families Charadriidae, Laridae, and Scolopacidae. The name Selenonycha (feminine singular) means crescent shaped claws and refers to the shape of the claws of the adult female.

Type species: Selenonycha baltoda, new species, ex. Charadrius wilsonia wilsonia Ord.; Charadriidae, Charadriiformes.

FEMALE. (1). Hypostomal apex ornamented slightly. (2). Lateral hypostomal teeth absent. (3). Chelicerae with three teeth. (4). Peritreme M-shaped; lateral branches each with 4-6 chambers; longitudinal branches each with 8-12 chambers. (5). Stylophore rounded posteriorly; extending to anterior margin of propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate weakly sclerotized, cleft; lateral margins of plate concave; anterior margin concave; ll not on plate. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with six pairs of setae arranged 3-2-1 to 2-3-1 due to variable nature of ll. (11). Setae l2, l3, d3 long; d3 closer to l2 than to l3. (12). Setae d4, l4, d5, l5 long; d4 lateral; d5 on pygidial plate. (13). Genital series with two pairs of setae; anal series



Fig. 16. *Torotroglia mimia* new species. Female (holotype): A, dorsal aspect; B, ventral aspect; C, peritreme.

with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 strongly divergent, fused to MCA2; MCA1 similar in shape to MCA2. (16). Coxae III and IV weakly sclerotized, margins indistinct. (17). Cuticular striations as in Fig. 18 A, B. (18). Legs I-IV subequal in thickness. (19). Legs with full complement of setae. (20). Setae a' and a'' multiserrate, 18-26 times. (21). Antaxial and paraxial members of claw pair subequal; claws broadly open in shape;

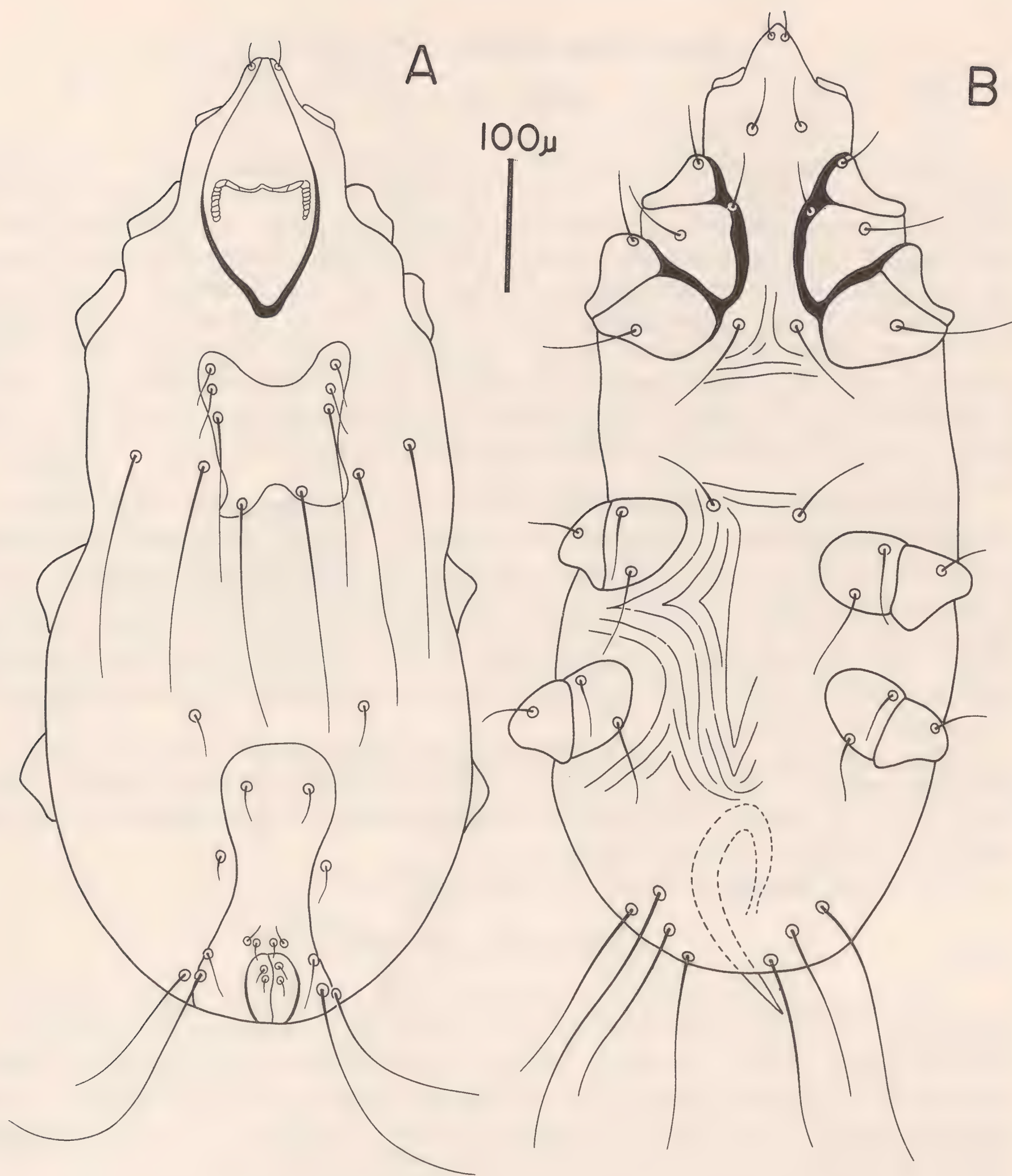


Fig. 17. Torotroglia mima new species. Male (paratype): A, dorsal aspect; B, ventral aspect.

extending to full length of empodium. (22). Order of hosts: Charadriiformes. (23). Types of feathers inhabit: unknown.

MALE. As in female except: (1). Hypostomal hyaline lips lacking. (3). Chelicerae edentate. (11). Setae l₃, d₃ short. (12). Setae d₄, d₅, l₅ short. (17). Cuticular striation patterns as in Fig. 19A, B. (21). Claws 1/2 length of empodium.

In addition to the type species, material representing two unnamed species was studied in an evaluation of the generic characters.

Selenonycha baltoda, new species

(Figs. 18, 19)

FEMALE (holotype). Length 1070μ ; width 312μ . Gnathosoma: Hypostomal apices unornamented, rounded. Peritremes with each lateral branch 5 chambered; each longitudinal branch 8 chambered. Dorsal idiosoma: Propodosomal plate not divided, cleft on posterior margin, lateral margins concave, bearing setae vi, ve, d1; ratios of vi:ve:sci:sce, 1:4:8:8; d1, l1, sce subequal. Hysterosomal plate absent; l2, d3, l3 subequal, each $1\frac{1}{2}$ length of ve; ratios of d4:l4:d5:l5, 1:1:1:1; l4, three times length of ve. Ventral idiosoma: As in Fig. 18 B. Legs: Setae dF, dG, dT of legs I and II smooth; a' and a'' I-IV each with 14-15 tines; a'I subequal to a''I; sc3 and sc4 subequal, extending beyond genua; vFI, II subequal, each not extending to ambulacrum; tc'III and IV subequal $\frac{2}{3}$ length of tc''III and IV.

MALE (paratype). Length 840μ ; width 300μ . Gnathosoma: Hypostomal apices unornamented. Peritremes as in female. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, l1; ratios of vi:ve:sci:sce, 1:2:3:4; l1 subequal to sce; d1 subequal to vi. Hysterosomal plate absent; l2 subequal to sci; d3, l3 each subequal to vi; ratios of d4:l4:g1:g2, 2:16:1:1; l4 twice length of sce. Ventral idiosoma and aedeagus: As in Fig. 19 B. Legs: As in female except a'I $\frac{1}{2}$ length of a''I; sc3, sc4 not extending beyond genua; tc'III and IV $\frac{1}{2}$ length of tc''III and IV.

Type material. From Charadrius wilsonia wilsonia Ord, Charadriidae; holotype female, 4 female paratypes, 1 male paratype, Cameron Parish, Louisiana, June, 1966, R. Heard. The holotype and paratypes are deposited with the University of Georgia, Athens, Georgia.

The name baltoda refers to the habitat of the host.

Creagonycha, new genus

The strongly recurved shape of the claws of species of Creagonycha distinguishes this genus from other genera having MCA1 strongly divergent and fused to MCA2. This new genus appears most similar to Selenonycha. These medium sized to large mites ($740\mu - 975\mu$) are found in the secondaries of charadriiform birds of the families Scolopacidae and Laridae. The name Creagonycha (feminine singular) means hooked claw and refers to the condition of the claw of the adult female.

Type species: Creagonycha lara, new species; ex. Larus delawarensis Ord, 1815; Laridae, Charadriiformes.

FEMALE. (1). Hypostomal apex slightly ornamented. (2). Lateral hypostomal teeth absent. (3). Chelicerae with three teeth. (4). Peritreme M-shaped; lateral branches each 4-5 chambered; longitudinal branches each with 14-18 chambers. (5). Stylophore rounded on posterior margin, not extending below propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate weak sclerotized, all margins concave; l1, d1 not on plate. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with six pairs of setae arranged 3-2-1. (11). Setae l2, d3, l3 long; d3 closer to l2 than to l3. (12). Setae l4, d5, l5 long, subequal in length; d4 short, length variable from $\frac{1}{8}$ to $\frac{1}{2}$ of length of l4. (13). Genital series with two pairs of setae; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 strongly divergent, fused to MCA2; MCA1 and

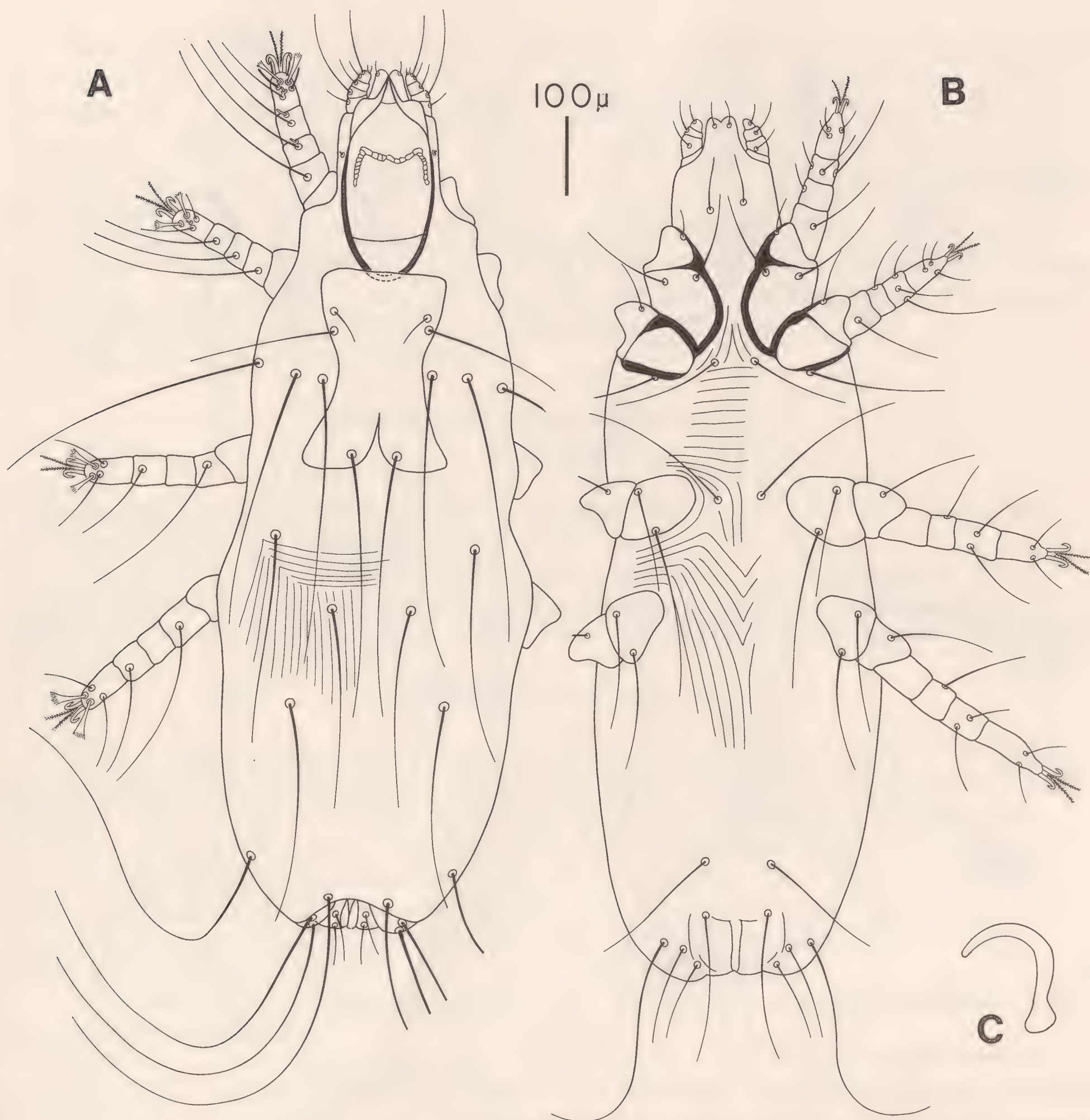


Fig. 18. Selenonycha baltoda new species. Female (holotype): A, dorsal aspect; B, ventral aspect; C, claw, tarsus IV.

MCA2 similar in shape. (16). Coxae III and IV weakly sclerotized, margins indistinct. (17). Cuticular striations as in Fig. 20 A, B. (18). Legs I-IV subequal in thickness. (19). Legs with full complement of setae. (20). Setae a' and a'' multiserrate, 14-22 tines. (21). Antaxial and paraxial members of claw pair subequal, strongly recurved in shape; (Fig. 20 C) claws $1/2$ length of empodium. (22). Order of hosts: Charadriiformes. (23). Types of feathers inhabit: secondaries and coverts.

MALE. As in female except: (1). Hypostomal lips without hyaline lips. (3). Chelicerae edentate. (8). Propodosomal plate weakly sclerotized, all margins concave; l1 not on plate. (11). Setae l3, d3 short. (12). Setae l4, d4, l5 short. (17). Claws recurved, but not as pronounced as in female; extending $1/3$ length of empodium.

The genus Creagonycha includes one named and 4 new species.

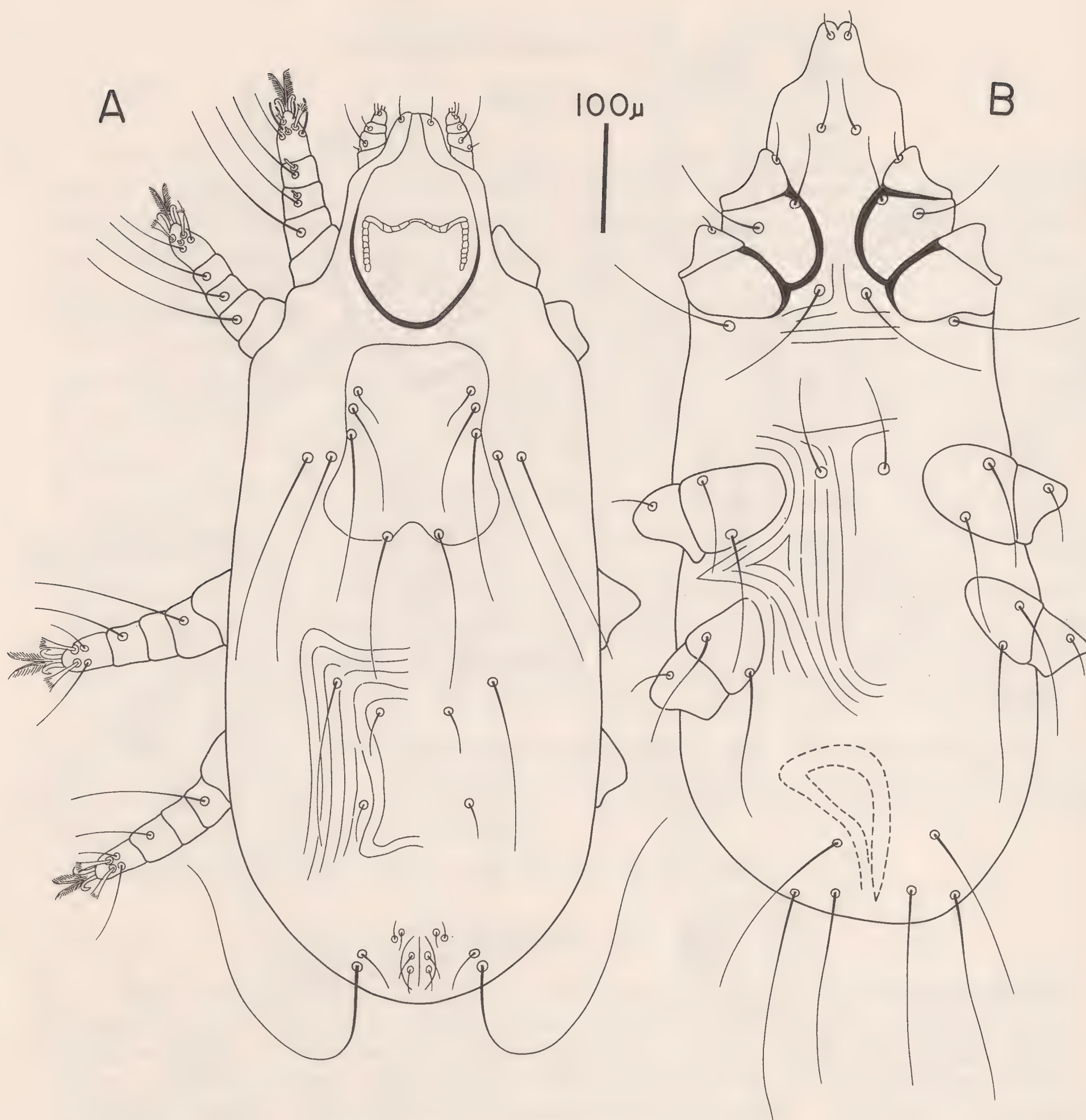


Fig. 19. Selenonycha baltoda new species. Male (paratype): A, dorsal aspect; B, ventral aspect.

Creagonycha lara, new species

(Figs. 20, 21)

FEMALE (holotype). Length 1060μ ; width 330μ . Gnathosoma: Hypostomal apices unornamented. Peritremes, each lateral branch one chambered; each longitudinal branch 15 chambered. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci; ratios of vi:ve:sci:sce, $1:2:6:6\frac{1}{2}$; sci, d1, l1 subequal in length to d1; ratios of d4:l4:d5:l5, $3:4:3:2$; d4 subequal to length of d1. Ventral idiosoma: As in Fig 20 B. Legs: Setae dF, dG, dT of legs I and II smooth; a' and a'' with 14-15 tines each, a'I subequal to a''I; sc3 and sc4 subequal, not extending beyond genua; vFII extending at least to ambulacrum.

MALE (paratype). Length 860μ ; width 305μ . Gnathosoma: Hypostomal apices unornamented. Peritremes as in female. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, d1; ratios of vi:ve:sci:sce, 1:1:2:3; d1, l1 each $3\frac{1}{4}$ times length of vi. Hysterosomal plate absent; l2 $\frac{2}{3}$ d1; d3 $\frac{1}{2}$ d1; l3 $\frac{1}{3}$ d1; ratios of d4:l4:g1:g2, 3:9:1:1; d4 subequal to vi. Ventral idiosoma and aedeagus: As in Fig. 21 B. Legs: As in female except a'I subequal to a'II.

Type material. From Larus delawarensis Ord, Laridae: holotype female, 6 female paratypes, 3 male paratypes, Coffee Bluff, Chatham County, Georgia, March 18, 1969, W. T. Atyeo, C. W. Proctor, J. B. Kethley. Holotype and all paratype deposited with the University of Georgia, Athens, Georgia.

The name lara refers to the host.

Creagonycha totana (Oudemans)
new combination

Syringophilus totani Oudemans, 1904, Entomol. Ber., 19:171; 1906, Mem. Soc. Zool. Paris 19: 57-62, Figs. 7, 8.

The holotype, on loan from Laboratoire d'Acarology, was examined. Described originally from Tringa totanus (L.) (= Totanus calidris = Totanus totanus) (Charadriiformes: Scolopacidae), in France, this species has not been recollected.

Chenophila, new genus

Among those genera having a posterior constriction of the stylophore (Chenophila, Stibarokra and Syringonomus), Chenophila is distinguished by the arrangement of the setae of the propodosomal region and the presence of the full complement of leg setae. The affinities of this new genus are difficult to ascertain, as the condition of the stylophore indicates only similarity rather than relationship. These medium sized mites (750μ - 820μ) are found in the flight feathers of anseriform birds of the family Anatidae. The name Chenophila (feminine singular) means goose lover and refers to the host relationship.

Type species: Chenophila branta, new species; ex. Branta canadensis (L.); Anatidae, Anseriformes.

FEMALE. (1). Hypostomal apex unornamented. (2). Lateral hypostomal teeth absent. (3). Chelicerae with one tooth. (4). Peritreme M-shaped; lateral branches each with 14-16 chambers. (5). Stylophore constricted posteriorly; subcutaneous to propodosomal plate to level of sci. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate entire, strongly sclerotized, rectangular. (9). Hysterosomal shield variable. (10). Setal pattern of propodosomal region with six pairs of setae arranged 3-1-2. (11). Setae l2, d3, l3 long; d3 closer to l2 than l3, or equidistant between l2 and l3. (12). Seta l4 long; d4, d5, l5 short; l4 on terminal tubercle. (13). Genital series with two pairs of setae; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 weakly divergent; fusion of MCA1 to MCA2 indistinct. (16). Coxae III and IV strongly sclerotized, rectangular in shape. (17). Cuticular striations as in Fig. 28 A, B; longitudinal between coxae III and IV. (18). Legs I thicker than II and legs II thicker than III and IV. (19). Legs with full complement of setae. (20). Setae a' and a'' multiserrate, 6-10 times. (21). Antaxial and paraxial member of claw pair subequal; claws $\frac{1}{2}$ length of empodium. (22). Order of hosts; Anseriformes. (23). Types of feathers inhabit: coverts. Only the female is known.

In addition to the type species, material representing twelve unnamed species was examined in an evaluation of the generic characters.

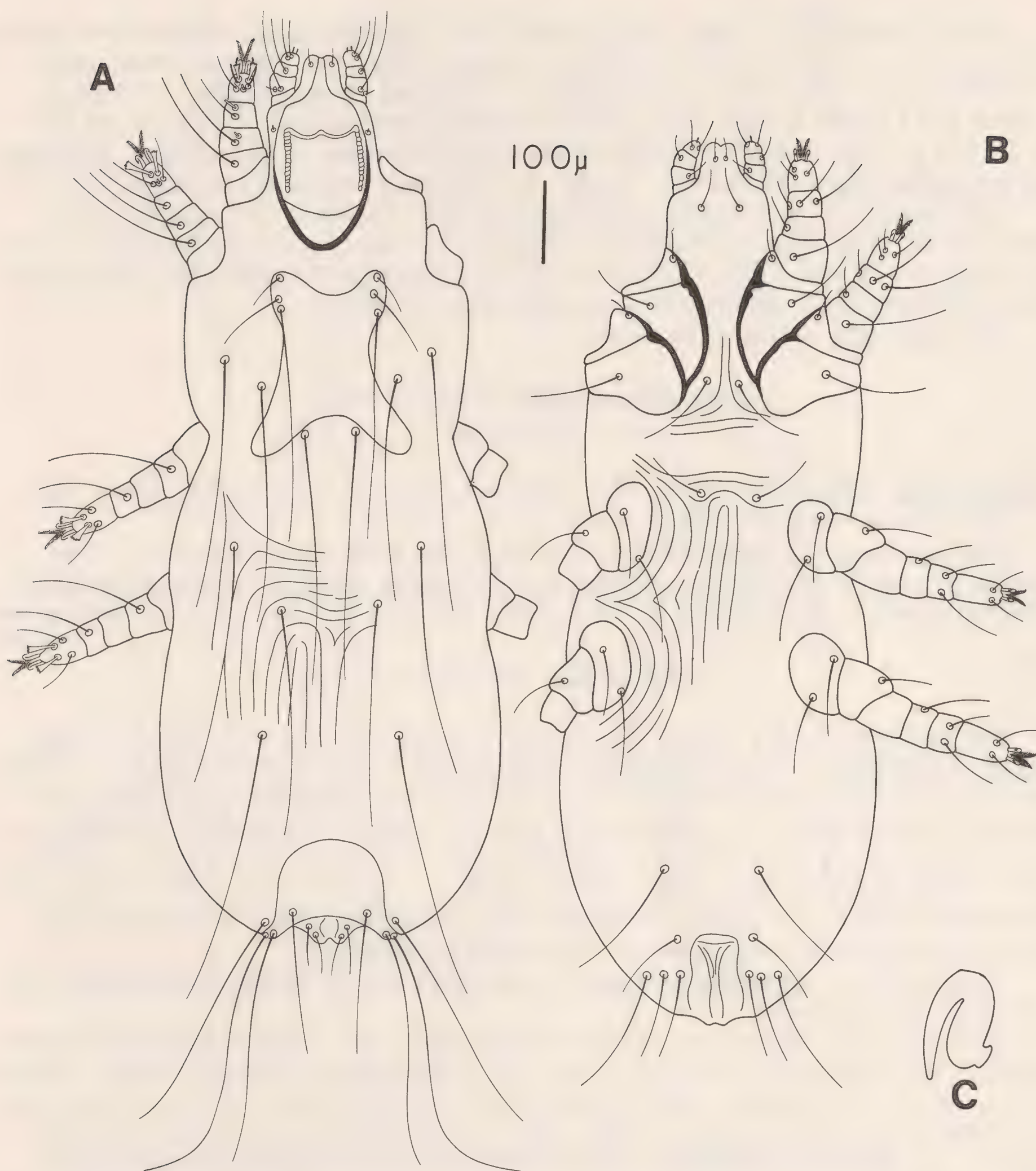


Fig. 20. Creagonycha lara new species. Female (holotype): A, dorsal aspect; B, ventral aspect; C, claw, tarsus IV.

Chenophila branta, new species

(Fig. 22)

FEMALE (holotype). Length 810μ ; width 218μ . Gnathosoma: Hypostomal apices unornamented, smooth. Peritremes (Fig. 22 E) with each lateral branch five chambered; each longitudinal branch 14 chambered. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, dl, ll; ratios of vi:ve:sci:

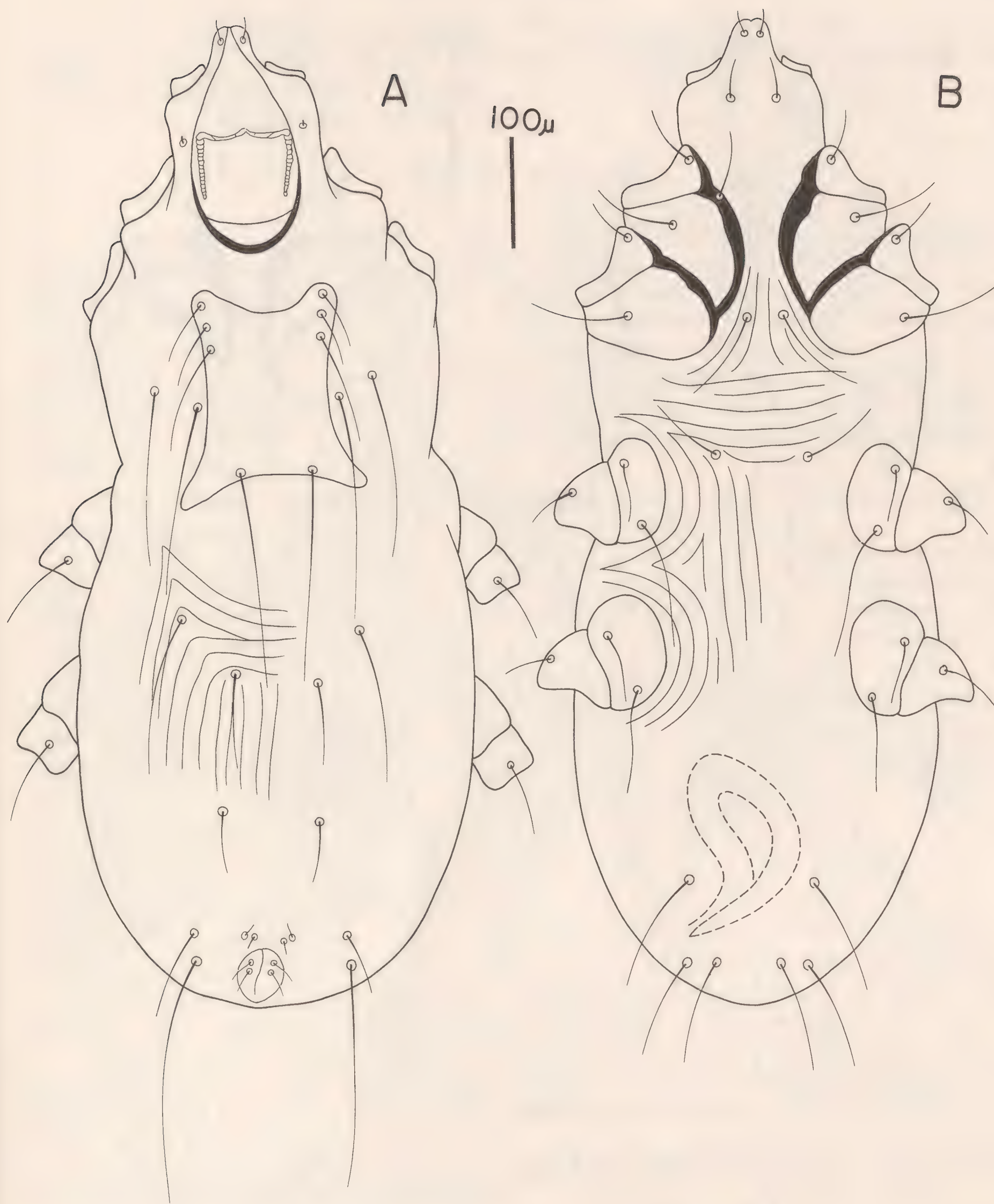


Fig. 21. Creagonycha lara new species. Male (paratype): A, dorsal aspect; B, ventral aspect.

sce, 1:1 1/2:1 3/4:2 1/4; d1, l1, sce subequal. Hysterosomal plate absent; l2, d3, l3 subequal, each 1/2 length of sce. Ventral idiosoma: As in Fig. 22 B. Legs: Setae dF, dG, dT of legs I and II smooth; a' and a'' I-IV each with 12-13 tines; a'I 1/2 length of a''I; sc3 and sc4 subequal, not extending beyond genua; vF I and II subequal, extending at least to ambulacrum; tc'III and IV subequal, 2/3 length of tc''III and IV. Only the female is known.

Type material. From Branta canadensis (L.), Anatidae: holotype female,

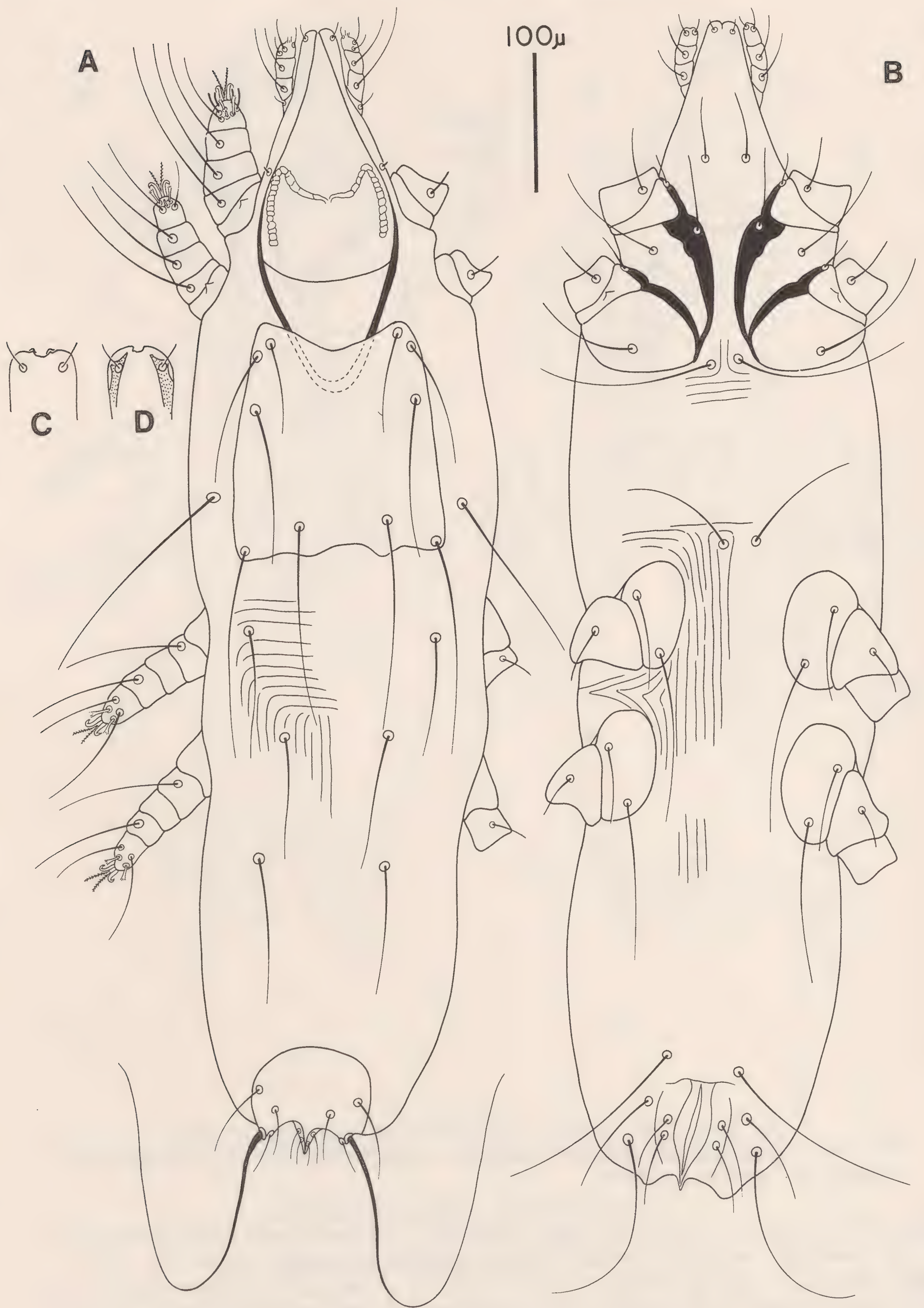


Fig. 22. Chenophila branta new species. Female (holotype): A, dorsal aspect; B, ventral aspect; C, hypostomal lips, dorsal aspect; D, hypostomal lips, ventral aspect.

30 female paratype, Kensington Park, Oakland County, Michigan, July 6, 1967, J. B. Kethley. The holotype and 10 female paratypes are deposited at the University of Georgia, Athens, Georgia.

The name branta refers to the host.

Aulobia, new genus

Among those genera having parallel MCA1, (Aulobia, Aulonastus, Niglarobia, Syringophiloidus, and Philoxanthornea), Aulobia is distinguished by the presence of the full complement of leg setae, and the lack of a basal angle of the claws. This genus appears to stand as a transition group between those genera of large mites with curved and fused MCA1 and those genera of small mites with parallel MCA1 and reduced leg setation. These small to medium sized mites (650 μ –800 μ) are found in the flight feathers of passeriform birds of the families Parulidae and Sylviidae. The name Aulobia (masculine singular) means inhabitant of small quills, and refers to the avian hosts.

Type species: Syringophilus dendroicae Clark, 1964, *Acarologia* 6: 86, Fig. 21; ex. Dendroica coronata (L.); Parulidae, Passeriformes.

FEMALE. (1). Hypostomal apex slightly ornamented, one pair median protuberances present. (2). Lateral hypostomal teeth absent. (3). Chelicerae edentate. (4). Peritreme M-shaped lateral branches each with 2–4 chambers; longibranches each with 10–16 chambers. (5). Stylophore rounded, not extending below propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate entire; lateral margins parallel; anterior margin concave; posterior margin scalloped. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with six pairs of setae arranged 2–1–12. (11). Setae 12, 13, d3 long; d3 closer to 12 than to 13. (12). Setae d4, 14 long; d5, 15 short. (13). Genital series with two pairs of setae; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 parallel, not fused to MCA2. (16). Coxae III and IV rectangular, subequal, strongly sclerotized. (17). Cuticular striation patterns as in Fig. 23 A, B. (18). Legs I–IV subequal in thickness. (19). Legs with full complement of setae. (20). Setae a' and a'' multiserrate; 6–10 tines. (21). Antaxial and paraxial members of claw pair subequal; claws 1/3 length of empodium. (22). Order of hosts: Passeriformes. (23) Types of feathers inhabit: primaries and secondaries.

MALE. As in female except: (1). Hypostomal apex unornamented. (11). Setae 12, 13, d3 short. (15). MCA1 weakly divergent, free, not fused to MCA2. (16). Coxae III and IV weakly sclerotized, margins indistinct. (17). Cuticular striations as in Fig. 24 A, B.

The genus Aulobia includes one named and two new species. The named species transferred to this genus is:

Aulobia dendroicus (Clark)
new combination

(Figs. 23, 24)

Syringophilus dendroicae Clark, 1964, *Acarologia* 6: 86, Fig. 21.

Although the holotype is lost, thirty-two paratypes on loan from the Public Health Service Rocky Mountain Laboratory were examined. Described originally from Dendroica coronata (L.) (Passeriformes: Parulidae), in Maryland, this species has been collected from the same host in Florida and Georgia, U. S. A.

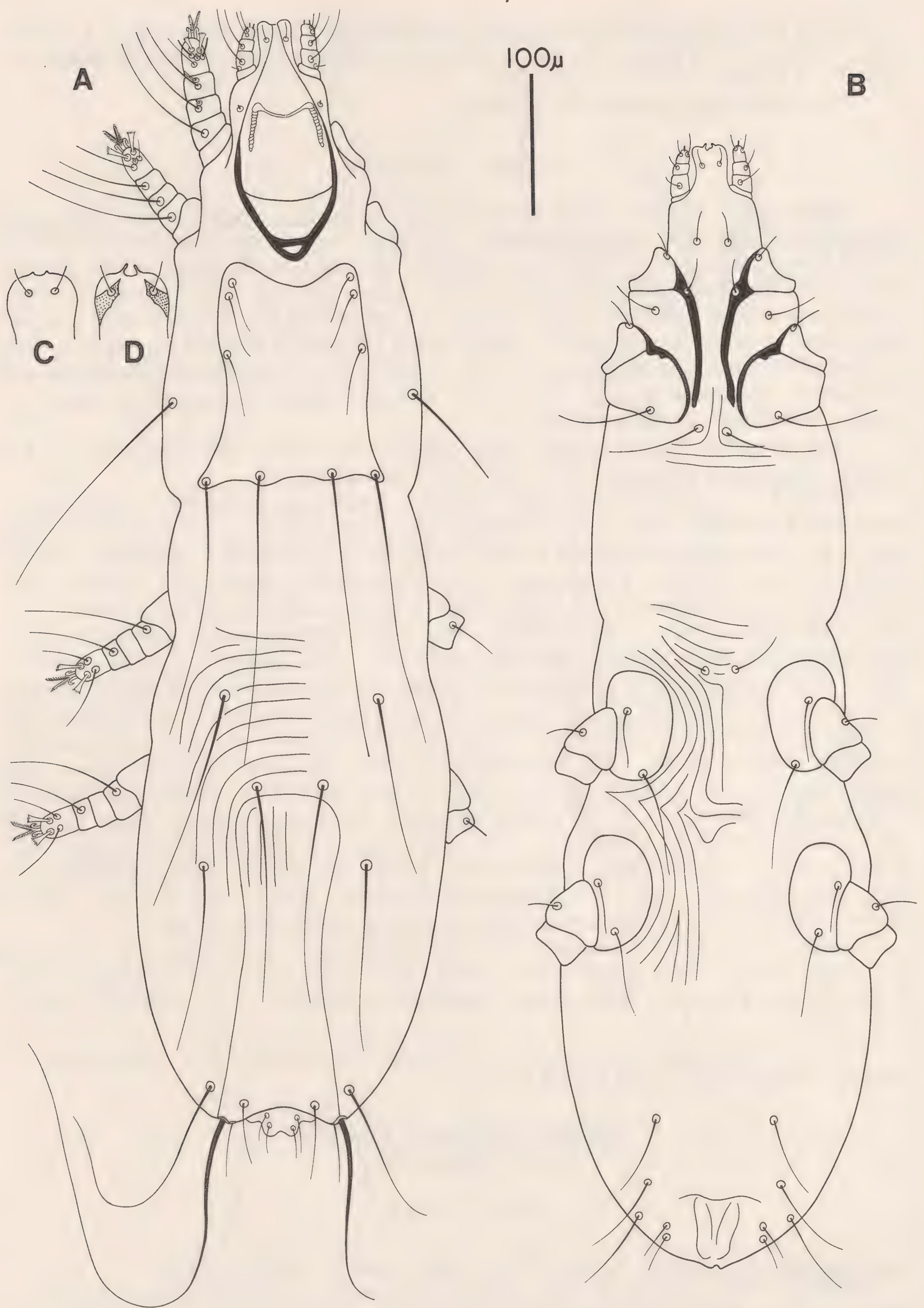


Fig. 23. *Aulobia dendroicus* (Clark). Female (paratype): A, dorsal aspect; B, ventral aspect; C, hypostomal lips, dorsal aspect; D, hypostomal lips, ventral aspect.

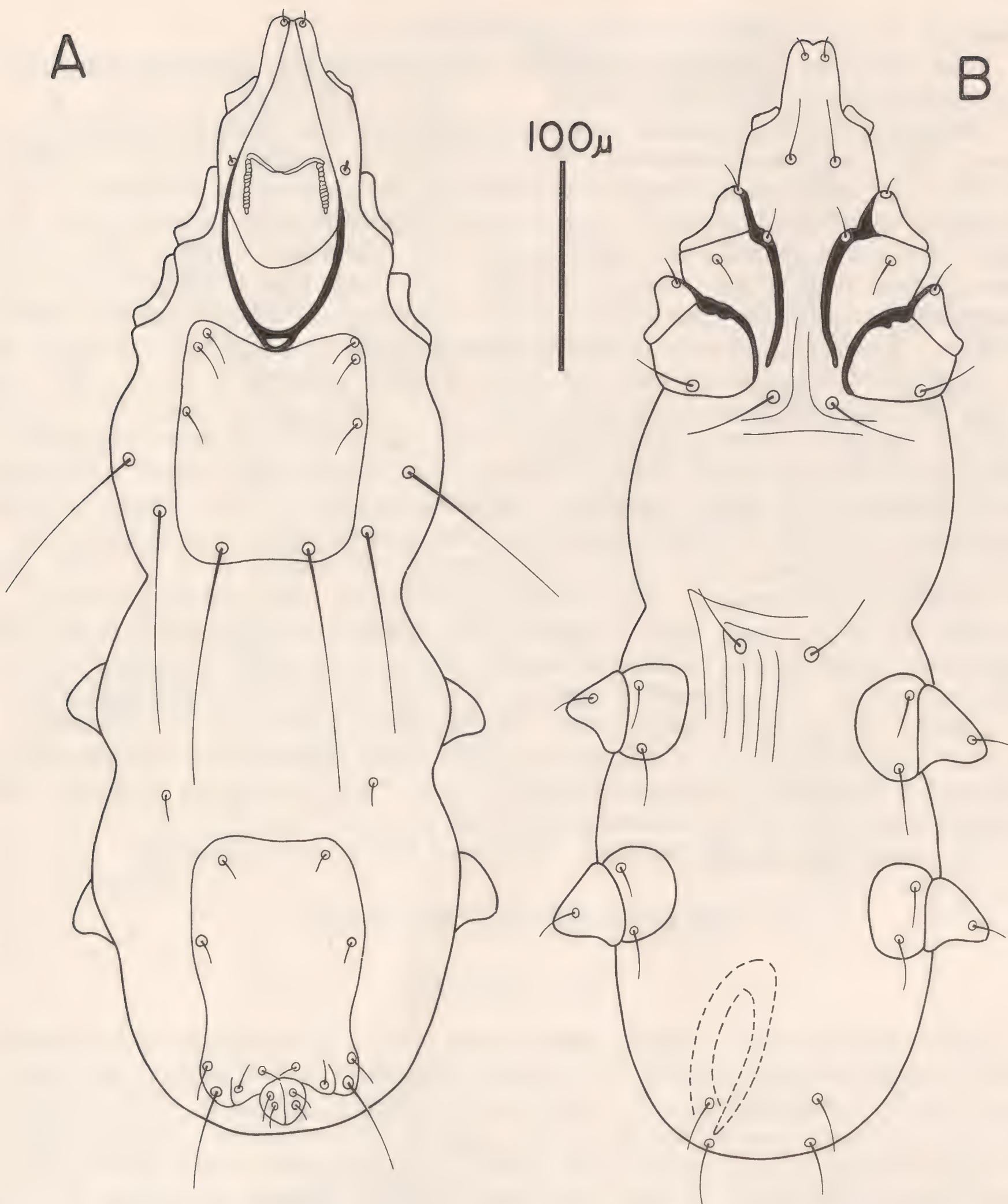


Fig. 24. Aulobia dendroicus (Clark). Male (paratype): A, dorsal aspect; B, ventral aspect.

Niglarobia, new genus

Within the previously mentioned genera having MCA1 parallel, Niglarobia is distinguished by the arrangement of the setae of the propodosomal region, claws with a basal angle, the loss of leg setae vs'II. This new genus is similar to Aulobia, but differs in the reduced leg setation. These small to medium sized mites ($520\mu - 650\mu$) are found in the primaries and secondaries of charadriiform birds of the family Scolopacidae. The name Niglaobia (masculine plural) means

inhabitant of small quills and refers to the host.

Type species: Niglarobia ereuneti, new species; ex. Ereunetes pusillus (L.); Scolopacidae, Charadriiformes.

FEMALE. (1). Hypostomal apex unornamented. (2). Lateral hypostomal teeth absent. (3). Chelicerae edentate. (4). Peritreme M-shaped; lateral branches each with 2-4 chambers; longitudinal branches each with 6-10 chambers. (5). Stylophore rounded posteriorly, extending to edge of propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate weakly sclerotized, margins indistinct; lateral margins parallel; anterior margin concave; posterior margin scalloped. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with six pairs of setae pattern of propodosomal region with six pairs of setae arranged 2-1-1-2. (11). Setae 12, 13, d3 long; d3 closer to 12 than to 13. (12). Setae d4, 14 long, d4 1/2 length of 14; d5, 15 short; d5 on pygidial plate. (13). Genital series with two pairs of setae; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 parallel, not fused to MCA2. (16). Coxae III and IV rectangular in shape, weakly sclerotized, margins indistinct; articulation to trochanters prominent. (17). Cuticular striations as in Fig. 25 A, B. (18). Legs I-IV subequal in thickness. (19). Setae vs 'II absent. (20). Setae a' and a" multiserrate, 6-10 times. (21). Antaxial and paraxial members of claw pair subequal, with basal angle; claws 1/3 length of empodium. (22). Order of hosts: Charadriiformes. (23). Types of feathers inhabit: secondaries and primaries.

MALE. As in female except: (8). Propodosomal plate weakly sclerotized, margins indistinct; d1, 11 not on plate. (10). Setal pattern of propodosomal region with six pairs of setae arranged 2-1-2-1. (11). Setae 13, d3 short. (12). Setae d4 short. (17). Cuticular striations as in Fig. 26 A, B.

The genus Niglarobia includes two named and four new species.

Niglarobia ereuneti, new species

(Figs. 25, 26)

FEMALE (holotype). Length 490 μ ; width 115 μ . Gnathosoma: Hypostomal apices unornamented, smooth. Peritremes with each lateral branch one chambered; each longitudinal branch 6 chambered. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, d1, 11; ratios of vi:ve:sci:sce, 1:1:1 1/4:4; sce, d1, 11 subequal in length. Hysterosomal plate absent; 12, d3 three times length of vi; 13 five times length of d1. Ventral idiosoma: As in Fig. 25 B. Legs: Setae dF, dG, dT of legs I and II smooth; a' and a" I-IV with six times each, a'I 1/2 length of a"I; sc3 and sc4 subequal, extending beyond genua; vFII extending at least to ambulacrum; tc'III and IV subequal each 1/2 length of tc"III and IV.

MALE (paratype). Length 400 μ ; width 120 μ . Gnathosoma: Hypostomal apices unornamented. Peritremes as in female. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, d1; ratios of vi:ve:sci:sce, 1:1:2:6; d1, 11, sce subequal. Hysterosomal plate absent; d3, 13 subequal to vi; 12 twice length of vi; ratios of d4:14:g1:g2, 2:8:1:1; d4 twice length of vi. Ventral idiosoma and aedeagus: As in Fig. 26 B. Legs: As in female except a'I subequal to a'II; sc3 and sc4 subequal, not extending beyond genua.

Type material. From Ereunetes pusillus (L.), Scolopacidae: holotype female, 1 male and 8 female paratypes, Sapelo Island, Georgia, February 12, 1968, W. B. Sikora. Holotype, 1 male and 4 female paratypes deposited with University of

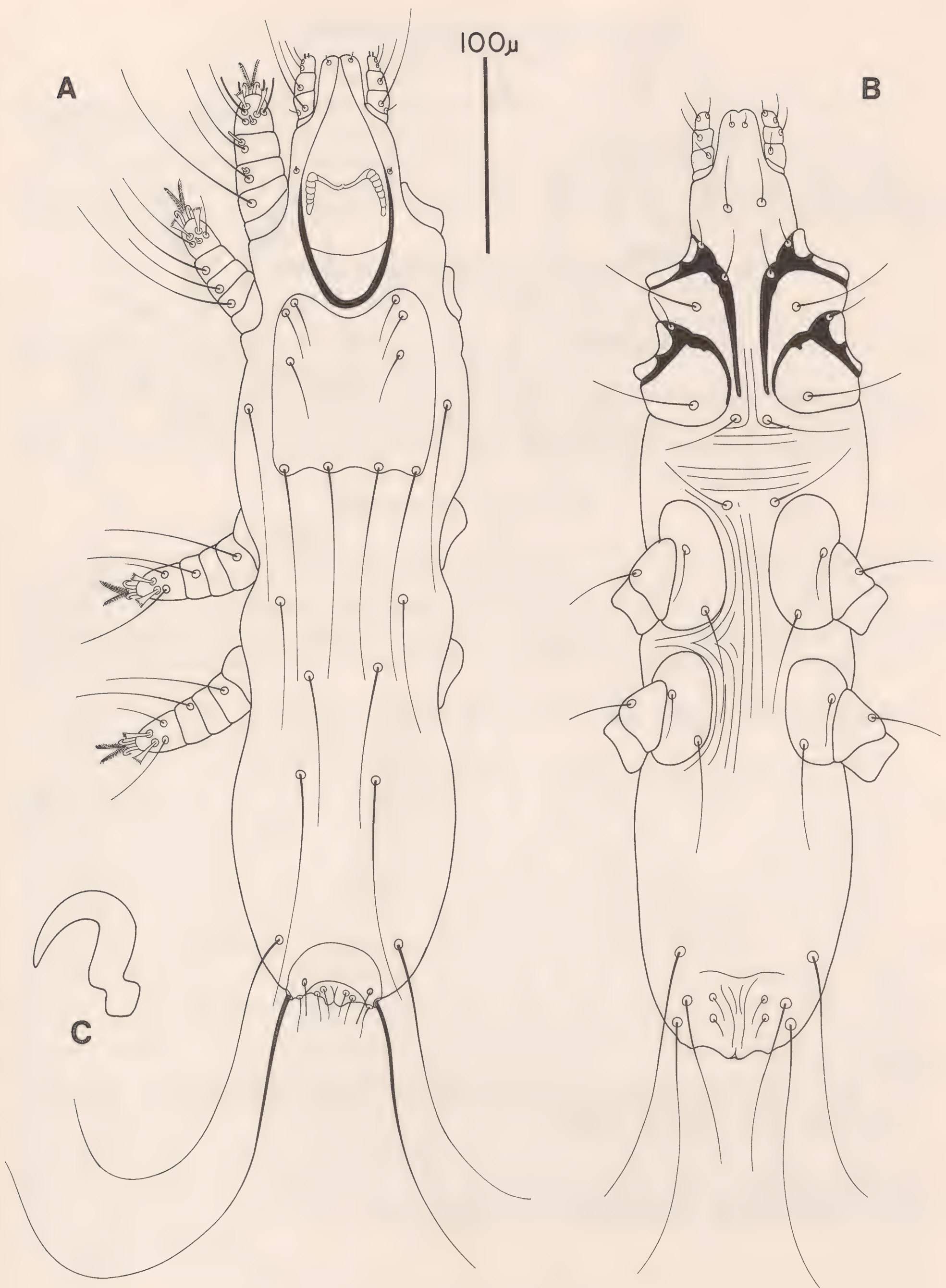


Fig. 25. Niglarobia ereuneti new species. Female (holotype): A, dorsal aspect; B, ventral aspect; C, claw, tarsus IV.

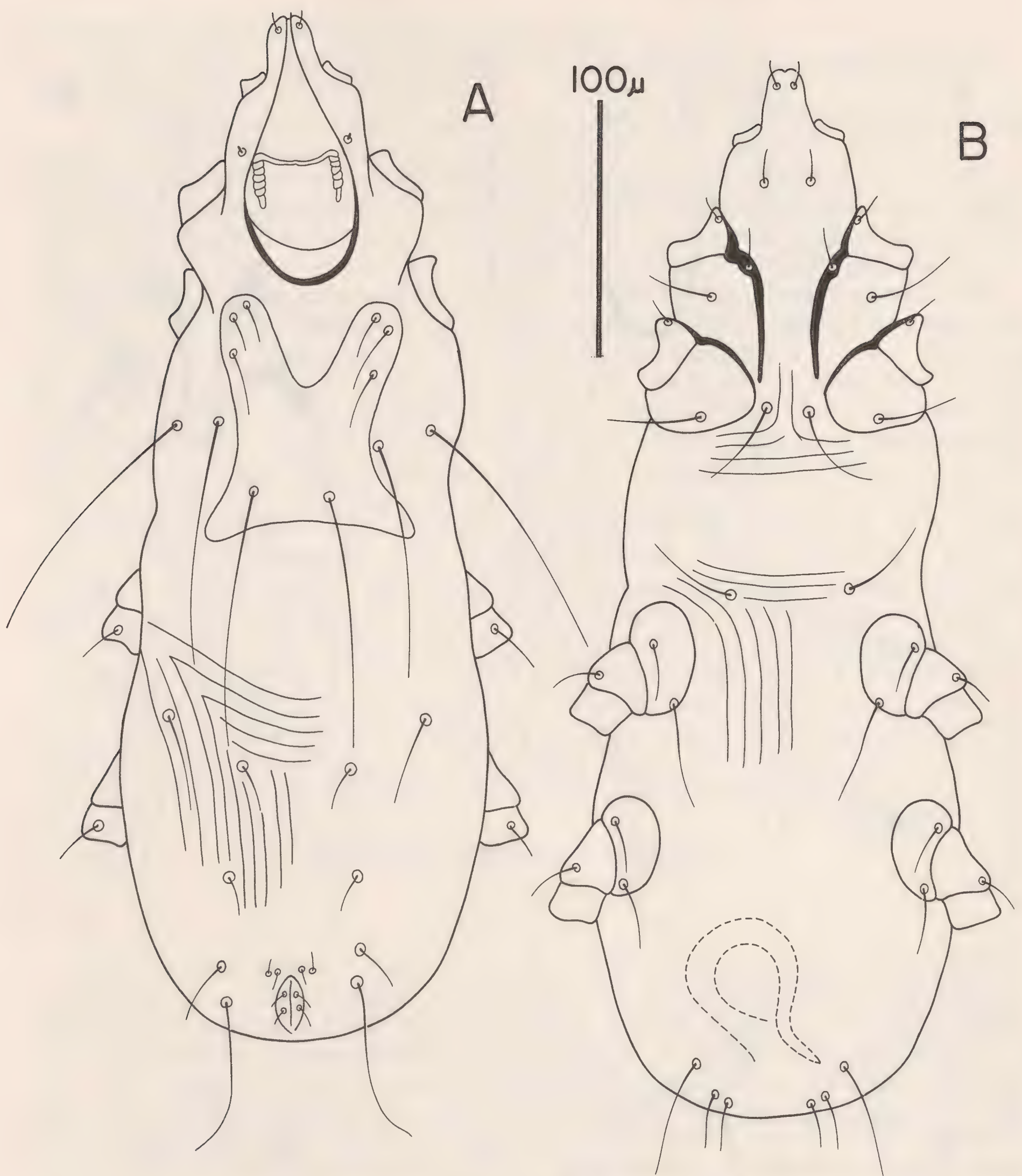


Fig. 26. Niglarobia ereuneti new species. Male (paratype): A, dorsal aspect; B, ventral aspect.

Georgia, Athens, Georgia.

The name ereuneti refers to the host.

Niglarobia helleri (Oudemans)
new combination

Syringophilus helleri Oudemans, 1904, Entomol. Ber. 20:190; 1906, Mem. Soc. zool. Paris 19:62-66, Figs. 9, 11.

The holotype of this species on loan from the Laboratoire d'Acarologie was examined. Described originally from Tringa ochropus (L.) (= Totanus ochropus) (Charadriiformes: Scolopacidae), in France, this species has not been recollected.

Niglarobia trouessarti (Oudemans)
new combination

Syringophilus trouessarti Oudemans, 1904, Entomol. Ber. 20:190; 1906, Mem. Soc. zool. Paris 19:67-72, Figs. 12-15.

The holotype of this species on loan from the Laboratoire d'Acarologie was examined. Described originally from Aramus scolopaceus (Gmelin) (Charadriiformes: Scolopacidae), in South America, this species has not been recollected.

Aulonastus, new genus

Among those genera having MCA1 parallel and not fused to MCA2, Aulonastus is distinguished by the loss of the following setae: vi, dTIII, dTIV, and a pair of anal setae. These small mites ($425\mu - 500\mu$) are found in the flight feathers of passeriform birds of the family Fringillidae and piciform birds of the family Picidae. The name Aulonastus (masculine plural) means dwelling in a small tube and refers to the avian hosts.

Type species: Aulonastus pipili, new species; ex. Pipilo erythrophthalmus (L.); Fringillidae, Passeriformes.

FEMALE. (1). Hypostomal apex slightly ornamented; paired median protuberances present. (2). Lateral hypostomal teeth absent. (3). Chelicerae edentate. (4). Peritreme M-shaped; each lateral branch 2-3 chambered; each longitudinal branch with 6-8 chambers. (5). Stylophore rounded posteriorly, not extending beneath propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate weakly sclerotized, margins indistinct; rectangular in shape. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with five pairs (vi absent) arranged 1-1-1-2. (11). Setae 12 variable, long or short; 13, d3, short; d3 closer to 12 than to 13. (12). Setae 14 long; d4, d5, 15 short; 14 on tubercle; 15 on pygidial plate. (13). Genital series with two pairs of setae; anal series with one pair of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 parallel, not fused to MCA2. (16). Coxae III and IV weakly sclerotized, margins indistinct; apophysis of articulation to trochanters prominent. (17). Cuticular striations as in Fig. 27 A, B. (18). Legs I thicker than II, and II thicker than III and IV. (19). Leg setae sc1, sc2, dTIII, dTIV absent. (20). Setae a' and a'' multiserrate, 6-8 times. (21). Antaxial and paraxial members of claw pair subequal; claws $1/3$ length of empodium. (22). Orders of hosts: Passeriformes and Piciformes. (23). Types of feathers inhabit: coverts.

MALE. Unknown.

Aulonastus pipili, new species

(Fig. 27)

FEMALE (holotype). Length 470μ ; width 120μ . Gnathosoma: Hypostomal apices unornamented, smooth. Peritremes with each lateral branch one chambered; each longitudinal branch 6 chambered. Dorsal idiosoma: Propodosomal plate not divided, bearing setae ve, sci, d1, l1; vi absent; ratios of ve:sci:sce: d1, 1:1:11:11; d1 and l1 subequal. Hysterosomal plate absent; l2 subequal to d1; d3, l3 each subequal to ve; ratios of d4:l4:d5:l5, 3:21:1:1; l5 twice the length of d1. Ventral idiosoma: As in Fig. 27 B. Legs: Setae dF, dG, dT of legs I and II smooth; a' and a'' IV each with 8 tines, a'I $2/3$ length of a''I; sc3 and sc4 subequal, extending beyond genua; vFI not extending to ambulacrum; vFII extending to ambulacrum; setae sc1, sc2, dTIII, dTIV absent; tc'III and IV $1/2$ length of tc''III and IV. Only the female is known.

Type material. From Pipilo erythrophthalmus (L.), Fringillidae: holotype female, 1 female paratype, Lake Placid, Highlands County, Florida, July, 1960, W. T. Atyeo, N. L. Braasch, K. R. Orwig. The holotype and 1 female paratype are deposited with the University of Georgia, Athens, Georgia.

The name pipili refers to the host.

Syringophiloidus, new genus

Within the genera previously mentioned having MCA1 parallel, Syringophiloidus is distinguished by the arrangement of the setae of the propodosomal region and the loss of leg setae dFII and vs'II. This new genus appears most similar to Niglarobia. These small to medium sized mites (630μ - 875μ) are found in the secondaries of piciform birds of the family Picidae, and passeriform birds of the following families: Bombycillidae, Cinclidae, Fringillidae, Icteridae, Laniidae, Muscicapidae, Paridae, Parulidae, Ploceidae, and Turdidae. The name Syringophiloidus (masculine singular), meaning like Syringophilus, refers to the superficial likeness to that genus.

Type species: Syringophilus minor Berlese, 1887, Acari, Myr. Scorp. 37, 10; ex. Passer domesticus (L.); Ploceidae, Passeriformes.

FEMALE. (1). Hypostomal apex smooth. (2). Lateral hypostomal teeth absent. (3). Chelicerae edentate. (4). Peritreme M-shaped; each lateral branch with 2-4 chambers; each longitudinal branch with 6-14 chambers. (5). Stylophore rounded posteriorly, usually extending below propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). Dorsal idiosomal setae smooth or spinose; other setae smooth. (8). Propodosomal plate entire, rectangular in shape. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with six pairs of setae arranged 2-1-1-2. (11). Setae l2, l3, d3 long; subequal; d3 closer to l2 than to l3. (12). Setae d4, l4 long, subequal; d5, l5 short, subequal. (13). Genital series with two pairs of setae; anal series variable, one or two pairs of anal setae present. (14). Paragenital series with three pairs of setae. (15). MCA1 parallel, not fused to MCA2. (16). Coxae III and IV moderately sclerotized, crescent shaped. (17). Cuticular striations as in Fig. 28 A, B; transverse between coxae III and IV. (18). Legs I thicker than II; legs II subequal in thickness to III and IV or legs I-IV subequal in thickness. (19). Leg setae dGII, and vs'II absent. (20). Setae a' and a'' multiserrate, 6-12 tines. (21). Antaxial and paraxial members of claw pair subequal; claws $1/3$ length of empodium. (22). Orders of hosts: Piciformes and Passeriformes. (23). Types of

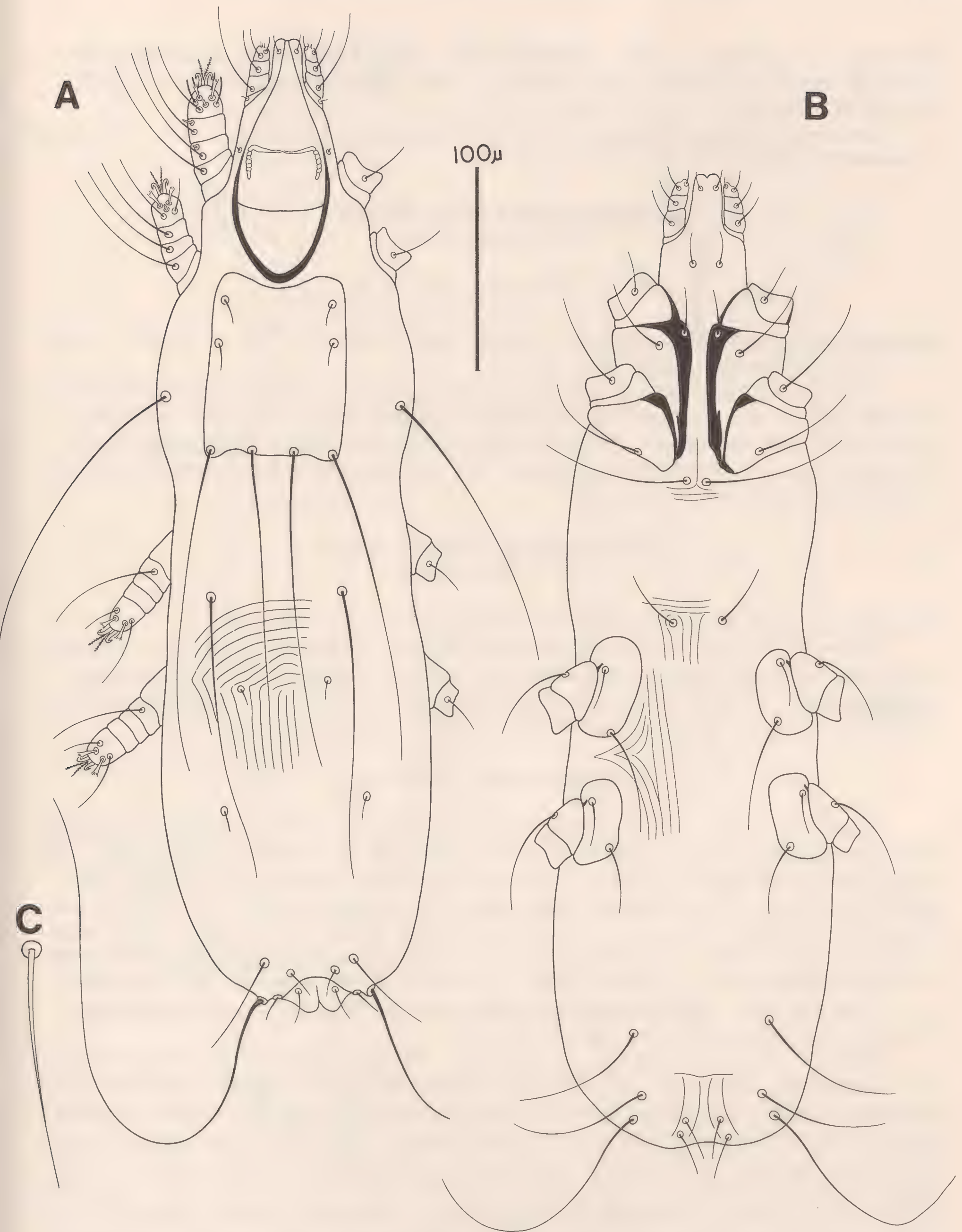


Fig. 27. *Aulonastus pipili* new species. Female (holotype): A, dorsal aspect; B, ventral aspect; C, idiosomal seta, smooth.

feathers inhabit: secondaries.

MALE. As in female except: (7). All setae smooth. (10). Setal pattern of propodosomal region 2-1-12 or 2-1-2-1 due to variable position of 11. (11).

Setae 12, 13, d3 short. (12). Setae d4 short. (14). Paragenital series with two pairs of setae; pg1 absent; pg3 terminal. (15). MCA1 weakly divergent. (17). Cuticular striations as in Fig. 29 A, B.

The genus Syringophiloidus includes 2 named and 18 new species. The named species transferred to this genus are:

Syringophiloidus minor (Berlese)
new combination

(Figs. 28, 29)

Syringophilus minor Berlese, 1887, Acari, Myr. Scorp. 37, 10. - Fritsch, 1958, Zool. Jahrbucher 86(3): 235, Fig. 5

Although all type material of this species is lost, material from the type host, on loan from C. D. Radford and the Rocky Mountain Laboratory, was adjudged conspecific and examined. Described originally from Passer domesticus (L.) (Passeriformes: Plociedae), in Europe, this species has been collected from the same host in England and Georgia.

Syringophiloidus seiurus (Clark)
new combination

Syringophilus seiuri Clark, 1964, Acarologia 6: 81, Figs. 24, 25.

Although the holotype of this species is lost, 16 paratypes on loan from the Rocky Mountain Laboratory were examined. Described originally from Seiurus aurocapillus (L.) (Passeriformes: Parulidae), in Maryland, this species has been collected from the same host in Florida and South Carolina, U.S.A.

Philoxanthornea, new genus

Among the genera having MCA1 parallel to weakly divergent Philoxanthornea is distinguished by the arrangement of the setae of the propodosomal region, the loss of ieg setae dGII, vs 'I and vs 'II, and the short length of 12, d3, 13. The affinities of this new genus are uncertain. These small mites (520 μ - 600 μ) are found in the flight feathers of charadriiform birds of the family Laridae and peleciform birds of the family Phaethontidae. The name Philoxanthornea (feminine singular) means lover of yellow birds, and refers to the name of the host birds.

Type species: Philoxanthornea anoa, new species; ex. Anous tenuirostris (Temminck) 1823; Laridae, Charadriiformes.

FEMALE. (1). Hypostomal apex smooth. (2). Lateral hypostomal teeth absent. (3). Chelicerae edentate. (4). Peritreme M-shaped; each lateral branch with 2-3 chambers; each longitudinal branch with 4-8 chambers. (5). Stylophore rounded posteriorly; not extending to propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin. (7). All setae smooth. (8). Propodosomal plate weakly sclerotized margins indistinct, rectangular in shape. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with six pairs of setae arranged 2-2-2. (11). Setae 12, d3, 13 short; d3 closer to 12 than to 13. (12). Setae 14 long; d4, d5, 15 short; d4, d5 on pygidial plate. (13). Genital series with two pairs of setae; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 parallel to weakly divergent; fusion of MCA1 and MCA2 indistinct. (16). Coxae III and IV weakly sclerotized, margins indistinct; articulations to trochanters prominent. (17). Cuticular striations as in Fig. 30 A, B.

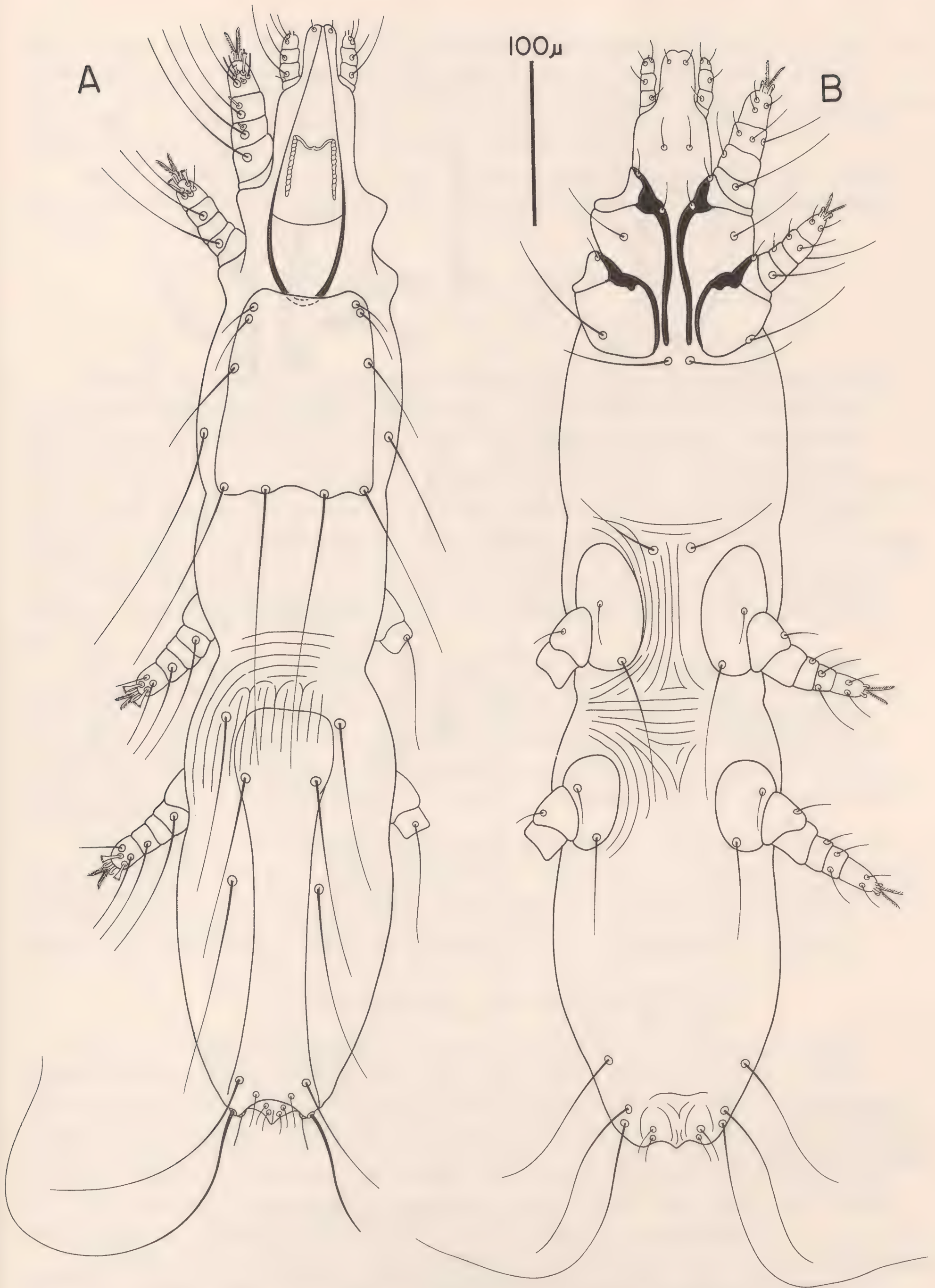


Fig. 28. Syringophiloidus minor (Berlese). Female: A, dorsal aspect; B, ventral aspect.

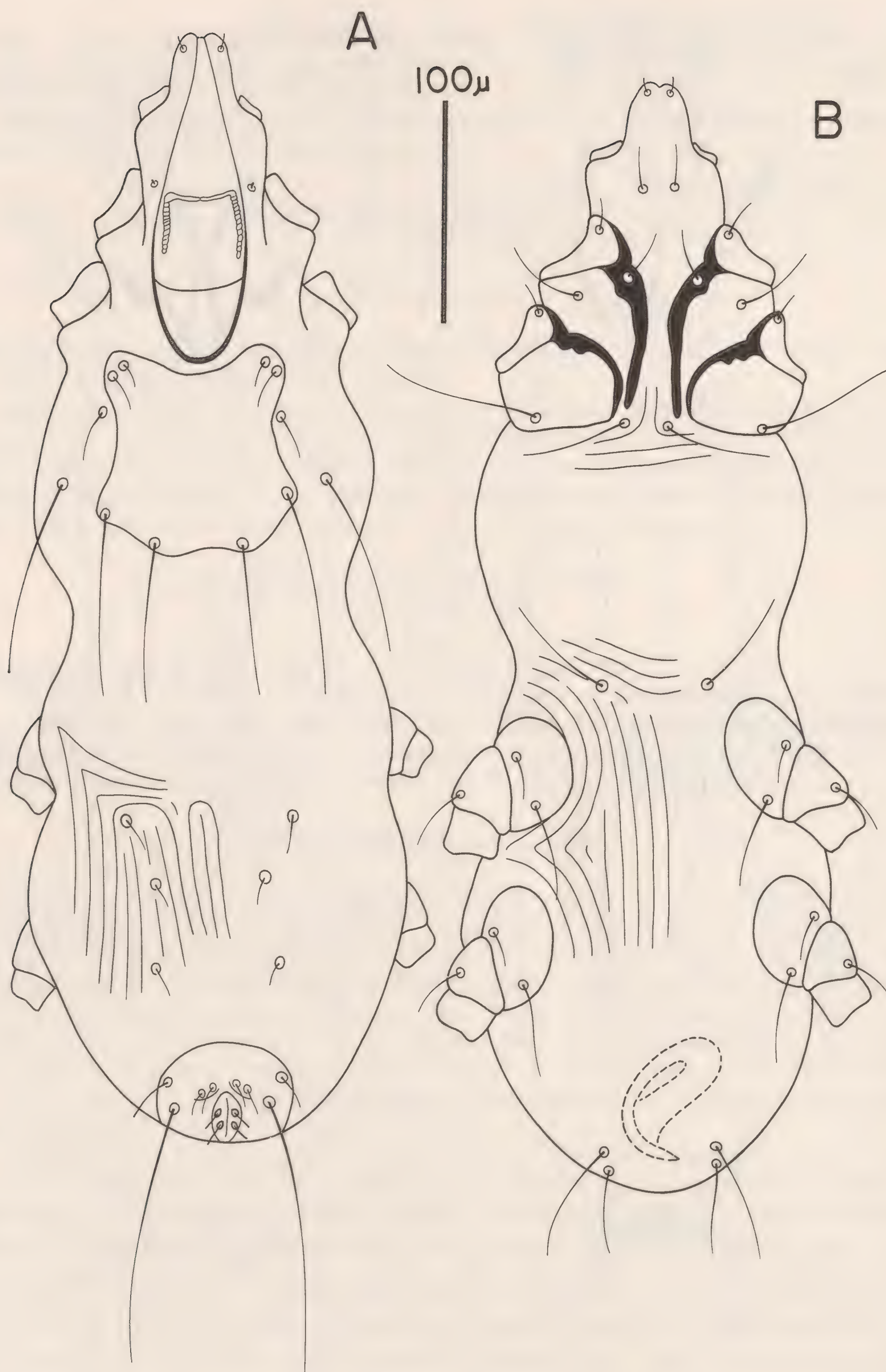


Fig. 29. *Syringophiloides minor* (Berlese). Male: A, dorsal aspect; B, ventral aspect.

(18). Legs I thicker than II; legs II subequal in thickness to III and IV. (19). Leg setae dGII, vs'I, vs'II absent. (20). Setae a' and a'' multiserrate; 4-6 tines. (21). Antaxial and paraxial members of claw pair subequal; with basal angle; claws extending 1/3 length of empodium. (22). Orders of hosts: Charadriiformes and Pelecaniformes. (23). Types of feathers inhabit: unknown.

MALE. As in female except: (9). Hysterosomal plate absent. (14). Para-genital series with two pairs of setae, one pair absent. (15). MCA1 weakly divergent. (21). Claws 1/4 length of empodium.

Philoxanthornea anoa, new species

(Figs. 30, 31)

FEMALE (holotype). Length 560 μ ; width 145 μ . Gnathosoma: Hypostomal apices unornamented, smooth. Peritremes, each lateral branch 1 chambered; each longitudinal branch with 6-7 chambers. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, dl, ll; ratios of vi:ve:sci:sce, 1:2:4 1/2:5; dl, ll, sci subequal in length. Hysterosomal plate present, bearing d3, l3, d4, d5; l2, d3, l3 each 1 1/2 times length of vi; ratios of d4:l4:d5:l5, 2:10:1:2/3; d4 three times length of vi. Ventral idiosoma: As in Fig. 30 B. Legs: Setae dF, dG, dT of legs I and II smooth; a' and a'' I-IV with six tines each, a'I 1/2 length of a''I; sc3 and sc4 subequal, not extending beyond genua; vFII extending at least to ambulacrum; tc'III and IV subequal, each 1/2 length tc''III and IV.

MALE (paratype). Length 450 μ ; width 130 μ . Gnathosoma: Hypostomal apices unornamented. Peritremes as in female. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, dl, ll; ratios of vi:ve:sci:sce, 1:2:3:2; dl, ll, sci subequal in length. Hysterosomal plate absent; l2, d3, l3 subequal, 1/2 length of vi; ratios of d4:l4:gl:g2, 3:18:1:1; d4 subequal to vi. Ventral idiosoma and aedeagus: As in Fig. 31 B. Legs: As in female except a'I subequal to a'II.

Type material. From Anous tenuirostris (Temminck), Laridae: Holotype female, 4 female paratypes, 2 male paratypes, Sand Island, Midway Atoll, Pacific Ocean, February 20, 1963, collector unknown. Holotype and 2 female paratypes and 1 male paratype deposited with U. S. National Museum, Washington D. C.; remaining paratypes deposited with University of Georgia, Athens, Georgia.

Peristerophila, new genus

Species of Peristerophila may be distinguished from all other species of Syringophilidae by the loss of setae vi, dFII, dFIII, dFIV, and vs'II, and the shape of MCA1 and MCA2. This new genus appears most similar to Aulonastus. These small to medium sized mites (670 μ - 780 μ) are found in the flight feathers of columbiform birds of the family Columbidae. The name Peristerophila (feminine singular) means pigeon lover, and refers to the host relationship of the genus.

Type species: Syringophilus columbae Hirst, 1920, Ann. Mag. Nat. Hist. 6:121-122; ex. Columba livia Gmelin; Columbidae, Columbiformes.

FEMALE. (1). Hypostomal apex ornamented; two pairs of median protuberances present. (2). Lateral hypostomal teeth absent. (3). Chelicerae edentate. (4). Peritreme M-shaped; each lateral branch with 2-3 chambers; each longitudinal branch with 6-10 chambers. (5). Stylophore rounded posteriorly; not extending below propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin.

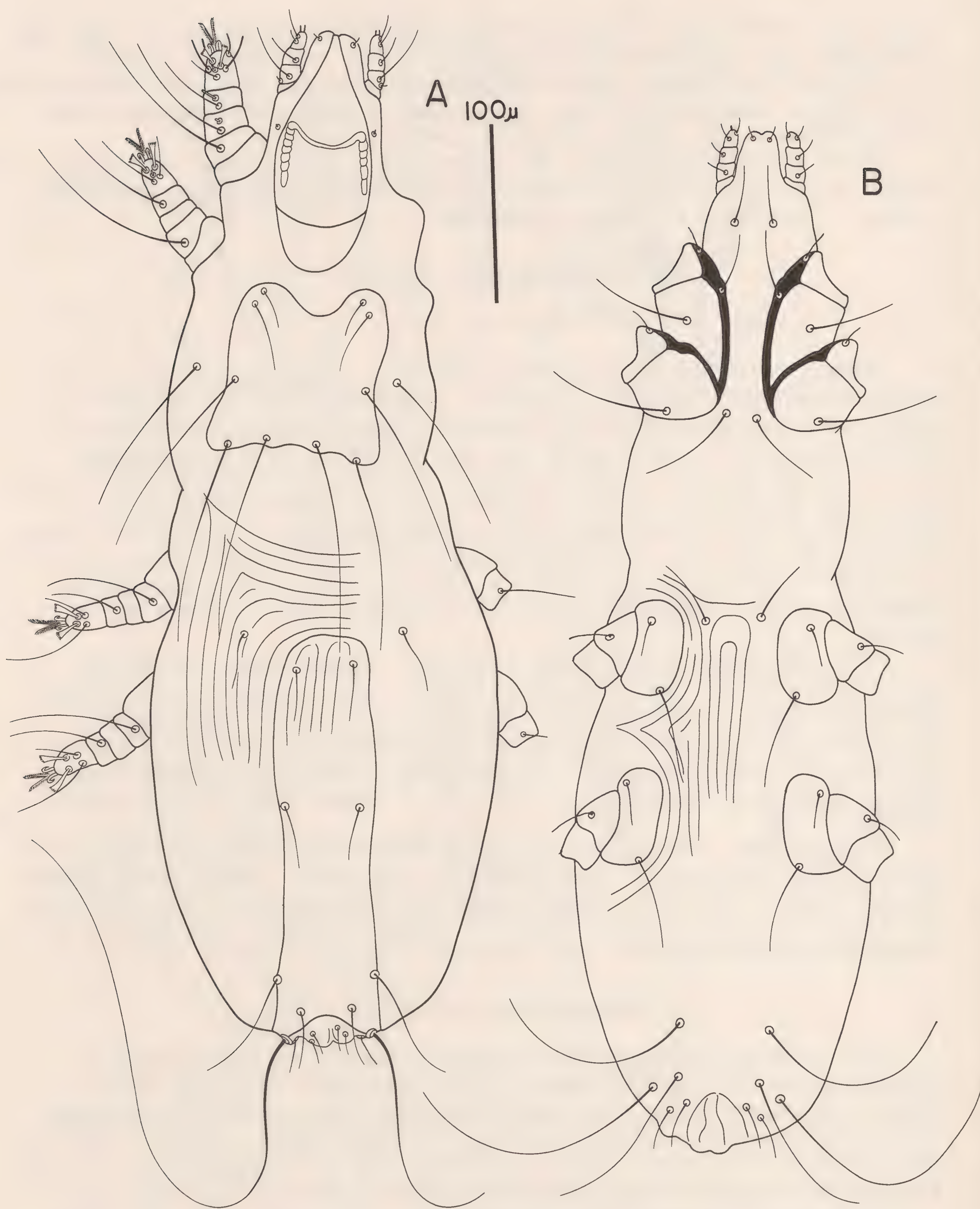


Fig. 30. *Philoxanthornea anoa* new species. Female (holotype): A, dorsal aspect; B, ventral aspect.

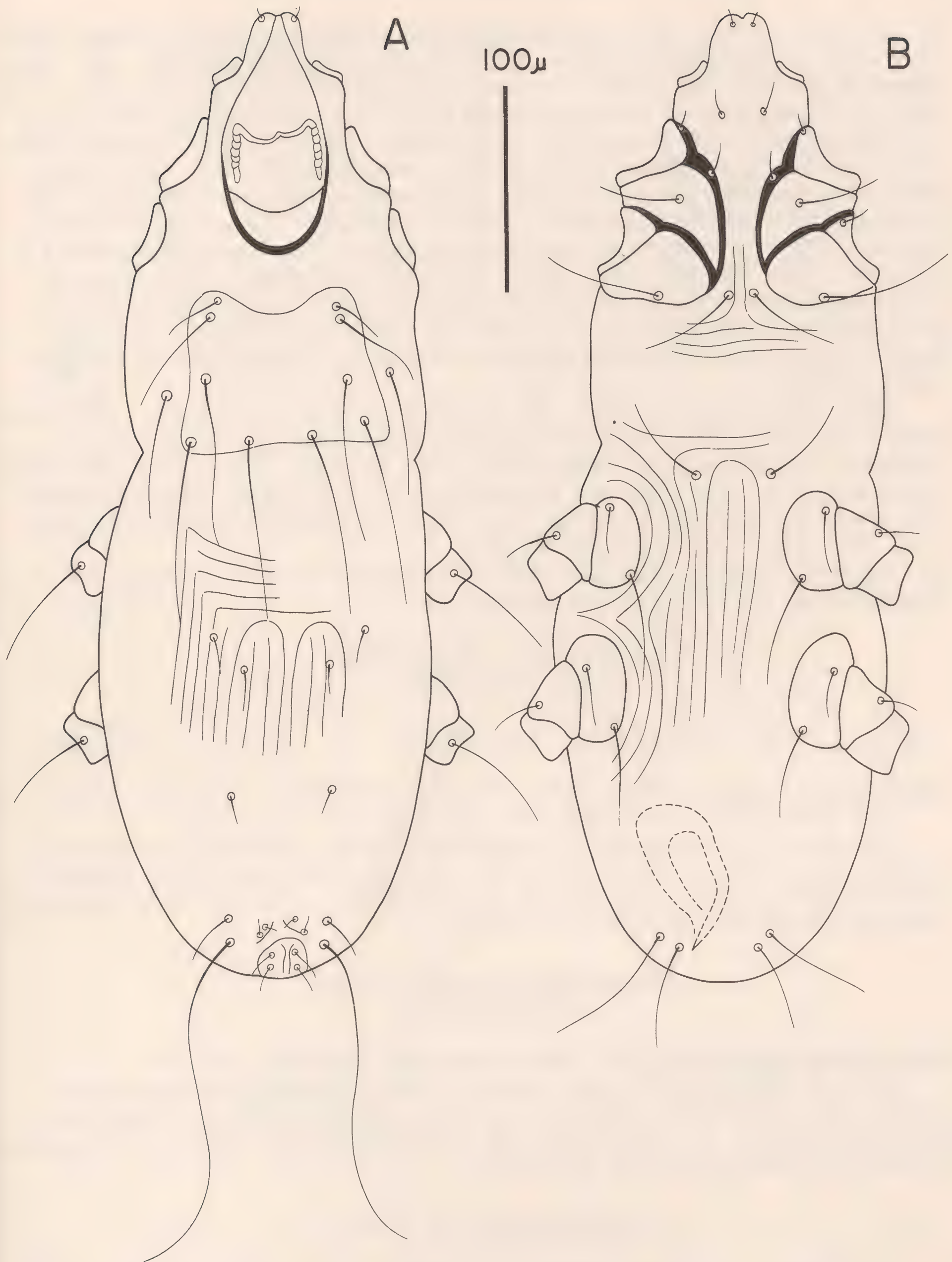


Fig. 31. Philoxanthornea anoa new species. Male (paratype): A, dorsal aspect; B, ventral aspect.

(7). All setae smooth. (8). Propodosomal plate weakly sclerotized, margins indistinct; entire, rectangular in shape. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with five pairs (vi absent) arranged 1-1-1-2. (11). Setae 12, 13, d3 long; d3 closer to 12 than to 13. (12). Setae d4, 14 long, d3 1/2 to 3/4 length of 14; d4, 15 short; 14, 15 on common tubercle. (13). Genital series with two pairs of setae; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 parallel, not fused to MCA2. (16). Coxae III and IV weakly sclerotized, margins indistinct. (17). Cuticular striations as in Fig. 32 A, B. (18). Legs I thicker than II; II subequal in thickness to III and IV. (19). Leg setae dFII, dFIII, dFIV, and vs'II absent. (20). Setae a' and a'' multiserrate, 16-24 times. (21). Antaxial and paraxial members of claw pair subequal; claws 1/2 length of empodium. (22). Order of hosts: Columbiformes. (23). Types of feathers inhabit: secondaries, primary coverts and secondary coverts.

MALE. As in female except: (1). Hypostomal apex unornamented. (10). Setal pattern of propodosomal region 2-2-1; 11 not on propodosomal plate, position variable. (11). Setae 13, d3 short. (12). Setae d4 short. (14). Paragenital series with two pairs of setae, one pair of setae absent. (15). MCA1 weakly divergent. (17). Cuticular striations as in Fig. 33 A, B. (18). Legs I-IV subequal in thickness. (21). Claws 1/3 length of empodium.

The genus Peristerophila includes two named and one new species. The named species transferred to this genus are:

Peristerophila columba (Hirst)
new combination

(Fig. 32)

Syringophilus columbae Hirst, 1920, Ann. Mag. Nat. Hist. 6:121-122; 1922, Brit. Mus. (Nat. Hist.) Econ. Ser. 13: Fig. 41.

Although all type material of this species is lost, specimens on loan from the University of Nebraska were adjudged conspecific and examined. Originally described from Columbia livia Gmelin (Columbiformes: Columbidae) in Tennessee, this species has been recollected in Kansas.

Peristerophila zenadoura (Clark)
new combination

Syringophilus zenadourae Clark, 1964, Acarologia, 6:83 Figs. 22, 23.

Although the holotype of this species is lost, one female paratype on loan from the Rocky Mountain Laboratory was examined. Originally described from Zenaidura macroura (L.) (Columbiformes: Columbidae) from Maryland, this species has been recollected from the type host.

Syringonomus, new genus

Within the group of genera having the posterior portion of the stylophore constricted, Syringonomus is distinguished by the annulate condition of the dorsal idiosoma setae of the adult female, one pair of setae in the genital series and the loss of leg setae vs'II. These small to medium sized mites (655 μ - 670 μ) are found in the flight feathers of procellariiform birds of the family Procellariidae and charadriiform birds of the family Laridae. The name Syringonomus (masculine

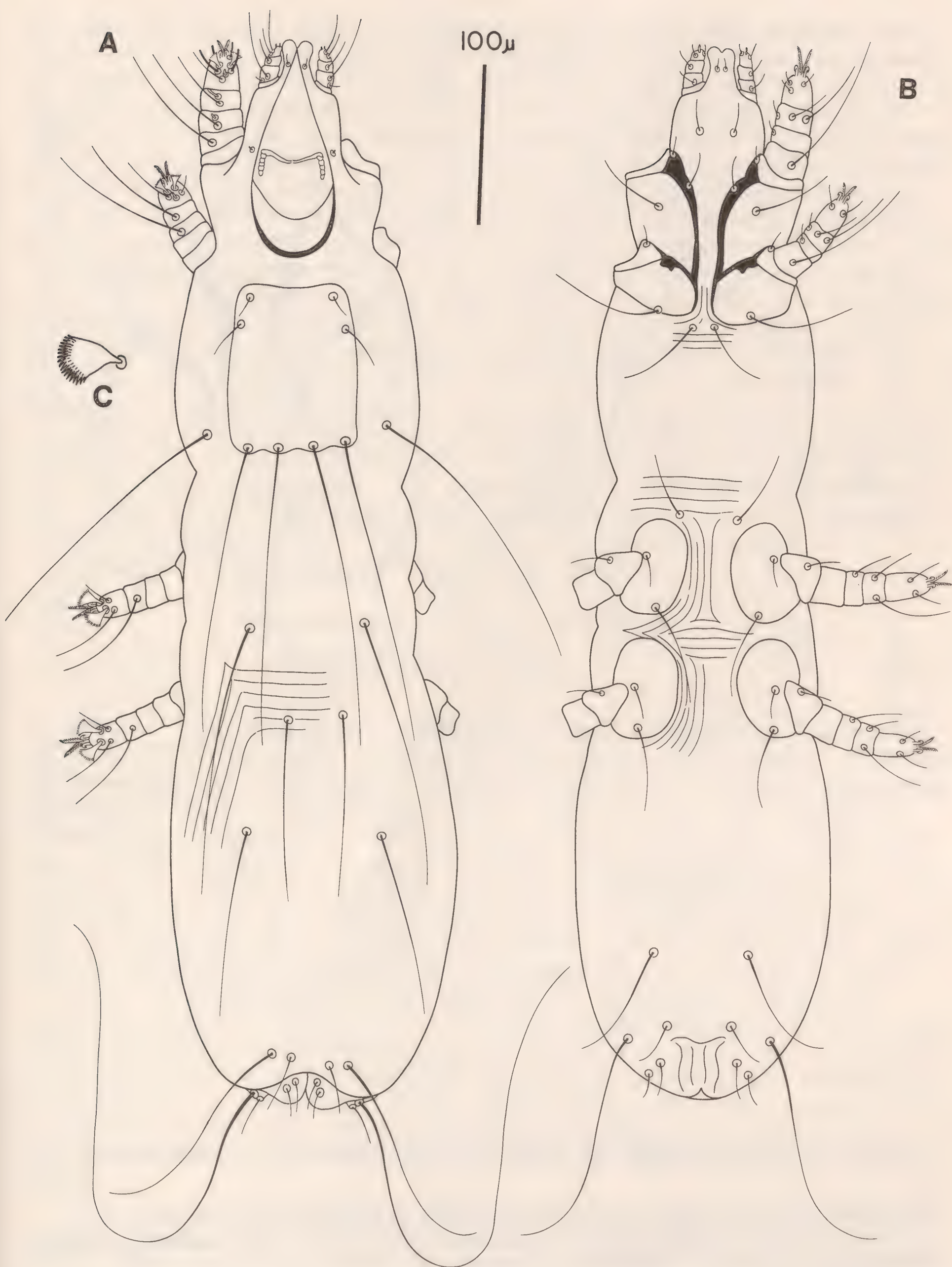


Fig. 32. *Peritserophila columba* (Hirst). Female: A, dorsal aspect; B, ventral aspect; C, a'IV.

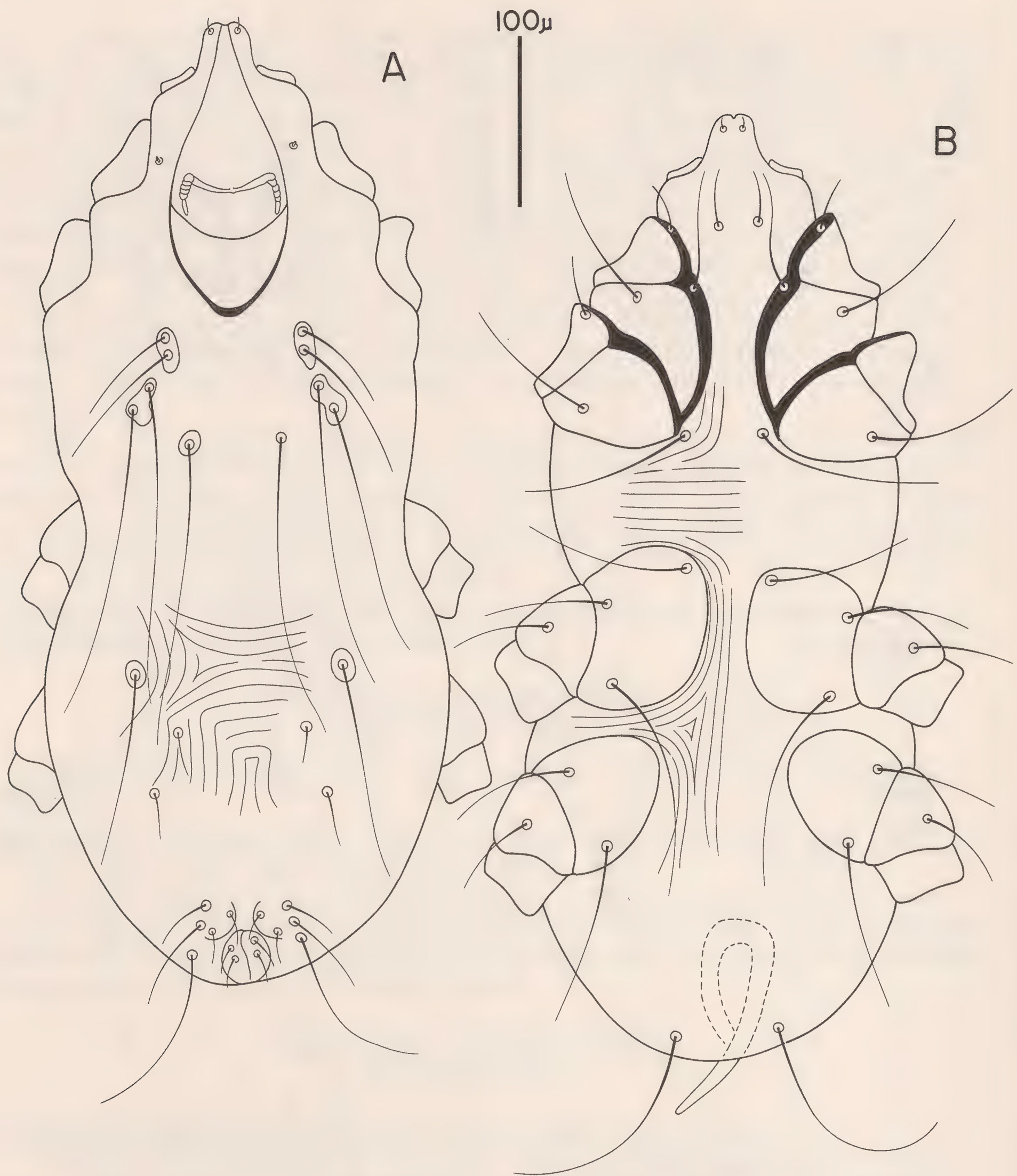


Fig. 33. Peristerophila sp. Male: A, dorsal aspect; B, ventral aspect.

singular) means inhabitant of tubes and refers to the avian host.

Type species: Syringonomus bulwerius, new species; ex. Bulweria bulweria (Jardine and Selby); Procellariidae, Procellariiformes.

FEMALE. (1). Hypostomal apex slightly ornamented; four small median protuberances present. (2). Lateral hypostomal teeth absent. (3). Chelicerae edentate. (4). Peritreme M-shaped; each lateral branch with 4-5 chambers; each longitudinal branch 14 chambered. (5). Stylophore constricted posteriorly, extending beneath propodosomal plate. (6). Palpal tibiotarsus rounded on distal margin.

(7). Setae vi, ve, sci, sce, l1, d1, l2, l3, d3, dFI, dFII, dTI annulate; other setae smooth. (8). Propodosomal plate weakly sclerotized, margins indistinct. (9). Hysterosomal plate absent. (10). Setal pattern of propodosomal region with six pairs of setae arranged 2-2-2. (11). Setae l2, l3, d3 long, subequal; d3 closer to l2 than to l3. (12). Setae d4, l4 long; d4 1/2 length of l4; d5, l5 short, d4, d5 on pygidial plate. (13). Genital series with one pair of setae, one pair of setae absent; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 weakly divergent, fused to MCA2. (16). Coxae III and IV strongly sclerotized; articulation to trochanters prominent. (17). Cuticular striations as in Fig. 34 A, B; longitudinal between coxae III and IV. (18). Legs I thicker than II; legs II thicker than III and IV. (19). Leg setae vs 'II absent. (20). Setae a' and a'' multiserrate, 6-8 times. (21). Antaxial and paraxial members of claw pair subequal, with basal angle; claws 1/2 length of empodium. (22). Orders of hosts: Procellariiformes and Charadriiformes. (23). Types of feathers inhabit: unknown.

MALE. As in female except: (5). Stylophore not extending under propodosomal plate. (7). All setae smooth. (10). Setal pattern of propodosomal region 3-2-1. (11). Setae l3, d3 short. (12). Setae d4 short. (14). Setae pg3 terminal. (16). Coxae III and IV weakly sclerotized, margins indistinct. (17). Cuticular striations as in Fig. 35 A, B. (21). Claws 1/3 length of empodium.

The genus Syringonomus includes one new species:

Syringonomus bulwerius, new species

(Figs. 34, 35)

FEMALE (holotype). Length 690 μ ; width 190 μ . Gnathosoma: Hypostomal apices slightly ornamented, two pairs of short protuberances present. Peritremes, each lateral branch 4 chambered; each longitudinal branch 12 chambered. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, sci, d1, l1; ratios of vi:ve:sci:sce, 1:1:1:2; d1, l1, sce subequal in length. Hysterosomal plate present, bearing d3, l3; l2, l3 subequal; d3 3/4 length of l2; ratios of d4:l4:d5:l5, 9:15:1:1; d4 1 3/4 times length of d1. Ventral idiosoma: As in Fig. 34 B. Legs: Setae dF, dG, dT of legs I and II annulate; a' and a'' I-IV with eight times each, a'I 2/3 length of a''I; sc3 and sc4 subequal, not extending beyond genua; vFII extending at least to ambulacrum; tc'III and IV 2/3 length of tc''III and IV.

MALE (paratype). Length 530 μ ; width 180 μ . Gnathosoma: Hypostomal apices unornamented. Peritremes as in female. Dorsal idiosoma: Propodosomal plate not divided, bearing setae vi, ve, d1; ratios of vi:ve:sci:sce, 1:2:2:2; l1 1 1/2 times length of vi; d1 1 1/4 times length of vi. Hysterosomal plate absent; d3, l3 subequal to length of vi; l2 1 1/2 length of vi; ratios of d4:l4:g1:g2, 5:30:1:1; d4 twice length of vi. Ventral idiosoma and aedeagus: As in Fig. 35 B. Legs: As in female except setae dF, dG, dT of legs I and II smooth; a'I subequal to a''II.

Type material. From Bulweria bulweria (Jardine and Selby), Procellariidae: holotype female, 2 male, 10 female paratypes, Nihoa Island, Hawaiian Islands, June 6, 1963, collector unknown. Holotype, 1 male and 5 female paratypes deposited with U. S. National Museum, Washington, D. C., additional paratypes deposited with University of Georgia, Athens, Georgia.

The name bulwerius refers to the host.

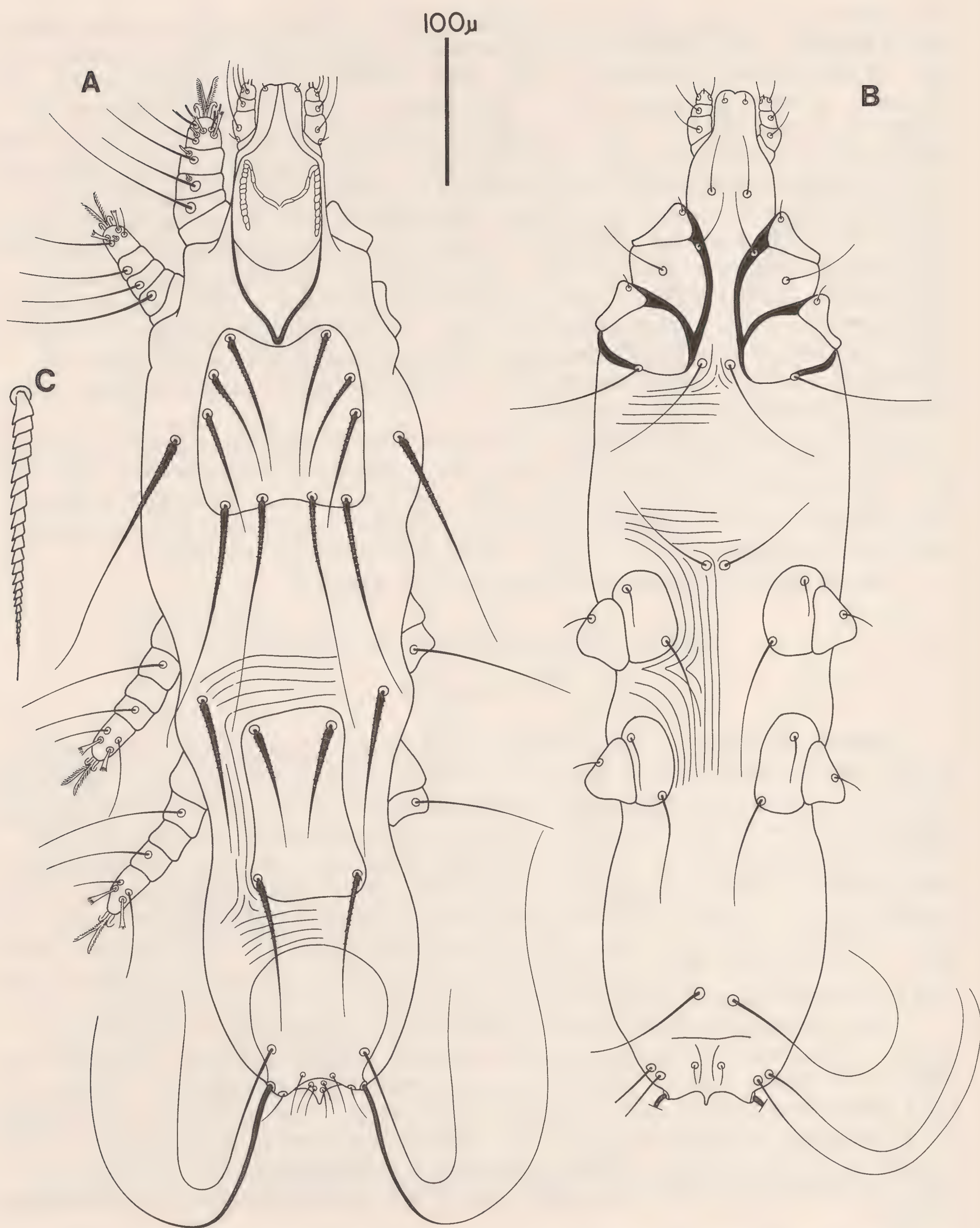


Fig. 34. *Syringonomus bulwerius* new species. Female (holotype): A, dorsal aspect; B, ventral aspect; C, idiosomal seta, annulate.

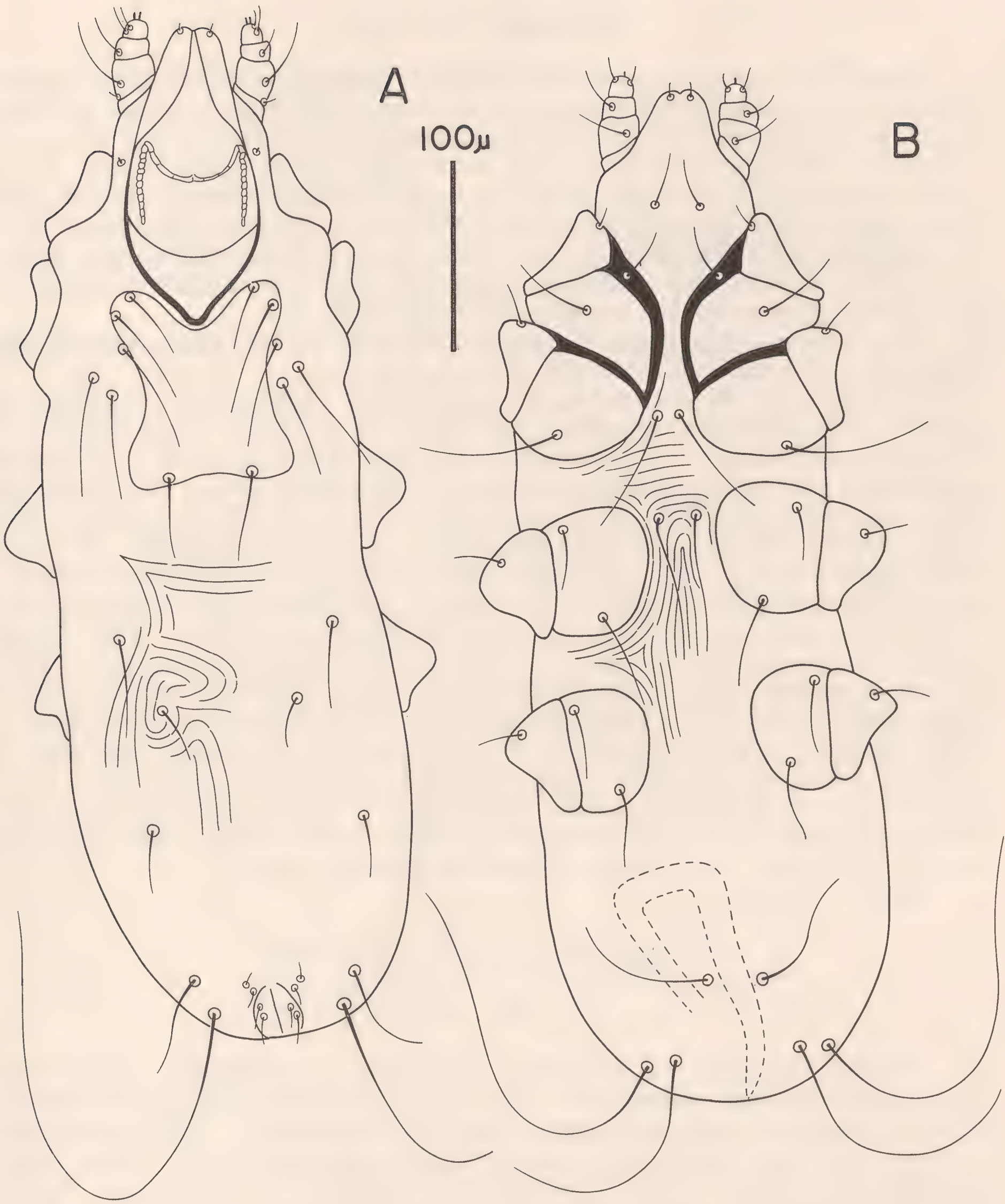


Fig. 35. Syringonomus bulwerius new species. Male (paratype): A, dorsal aspect; B, ventral aspect.

Stibarokris, new genus

Among the previously mentioned genera having a constriction of the posterior margin of the stylophore, Stibarokris is distinguished by the presence of lateral hypostomal teeth, and the absence of leg setae vs'II. Although this new genus is grouped with those genera having a common stylophore configuration, the presence of the lateral hypostomal teeth is a unique feature among the Syringophilidae. These medium sized mites (650μ – 790μ) are found in the covert feathers of pelecaniform birds of the family Phalacrocoracidae and ciconiiform birds of the family Phoenicopteridae. The name Stibarokris (masculine singular) means sturdy projection and refers to the lateral hypostomal teeth.

Type species: Stibarokris phalacrus, new species, ex. Phalacrocorax auritus (Lesson), 1831; Phalacrocoracidae, Pelecaniformes.

FEMALE. (1). Hypostomal apex unornamented. (2). Lateral hypostomal teeth present. (3). Chelicerae edentate. (4). Peritreme M-shaped; each lateral branch with 6–7 chambers; each longitudinal branch with 10–16 chambers. (5). Stylophore constricted posteriorly, extending beneath propodosomal plate. (6). Palpal tibio-tarsus truncate. (7). Setae vi, ve, sci, sce, d1, l1, l2, d3, l3 knobbed; other setae smooth. (8). Propodosomal plate entire, rectangular in shape. (9). Hysterosomal plate bears l2, d3. (10). Setal pattern of propodosomal region with six pairs of setae arranged 2–2–2. (11). Setae l2, d3, l3 long; d3 closer to l2 than to l3. (12). Setae d4, l4 long, d4 1/2 length of l4; d5, l5 short. (13). Genital series with two pairs of setae; anal series with two pairs of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 weakly divergent, fused to MCA2 indistinctly. (16). Coxae III and IV strongly sclerotized, rectangular. (17). Cuticular striations as in Fig. 36 A, B. (18). Legs I thicker than legs II; legs II thicker than III and IV. (19). Leg setae vs'II absent. (20). Setae a' and a'' multiserrate, 8–14 tines. (21). Antaxial and paraxial members of claw pair subequal; claws 1/2 length of empodium. (22). Orders of hosts: Pelecaniformes and Ciconiiformes. (23). Types of feathers inhabit: coverts.

MALE. Unknown.

Stibarokris phalacrus, new species

(Fig. 36)

FEMALE (holotype). Length 800μ ; width 245μ . Gnathosoma: Hypostomal apices unornamented, smooth (Fig. 36 C, D). Peritremes, each lateral branch with 5–6 chambers; each longitudinal branch 12 chambered. Dorsal idiosoma: Propodosomal plate not divided bearing setae vi, ve, sci, d1, l1; ratios of vi:ve:sci:sce, $1:1\frac{1}{8}:1\frac{1}{4}:1\frac{1}{2}$; l1 subequal to sce; d1 $1\frac{1}{6}$ length l1. Hysterosomal plate divided, restricted to bases of d3; l2, d3, l3, subequal to sce; ratios of d4:l4:d5:l5, $8:32:1:2$; d4 subequal to length of l1. Ventral idiosoma: As in Fig. 36 B. Legs: Setae dF, dG, dT of legs I and II smooth; a' and a'' I–IV with 8 tines each, a'I subequal to a''I; sc3 extending beyond genu III; sc4 not extending beyond genu IV; vFI not extending to ambulacrum; vFII extending at least to ambulacrum; tc'III and IV 1/2 length tc"III and IV. Only the female is known.

Type material. From Phalacrocorax auritus (Lesson), Phalacrocoracidae: holotype female, 7 female paratypes, Pigeon Key, Monroe County, Florida, November 28, 1967, R. Heard, W. B. Sikora.

The name phalacrus refers to the host.

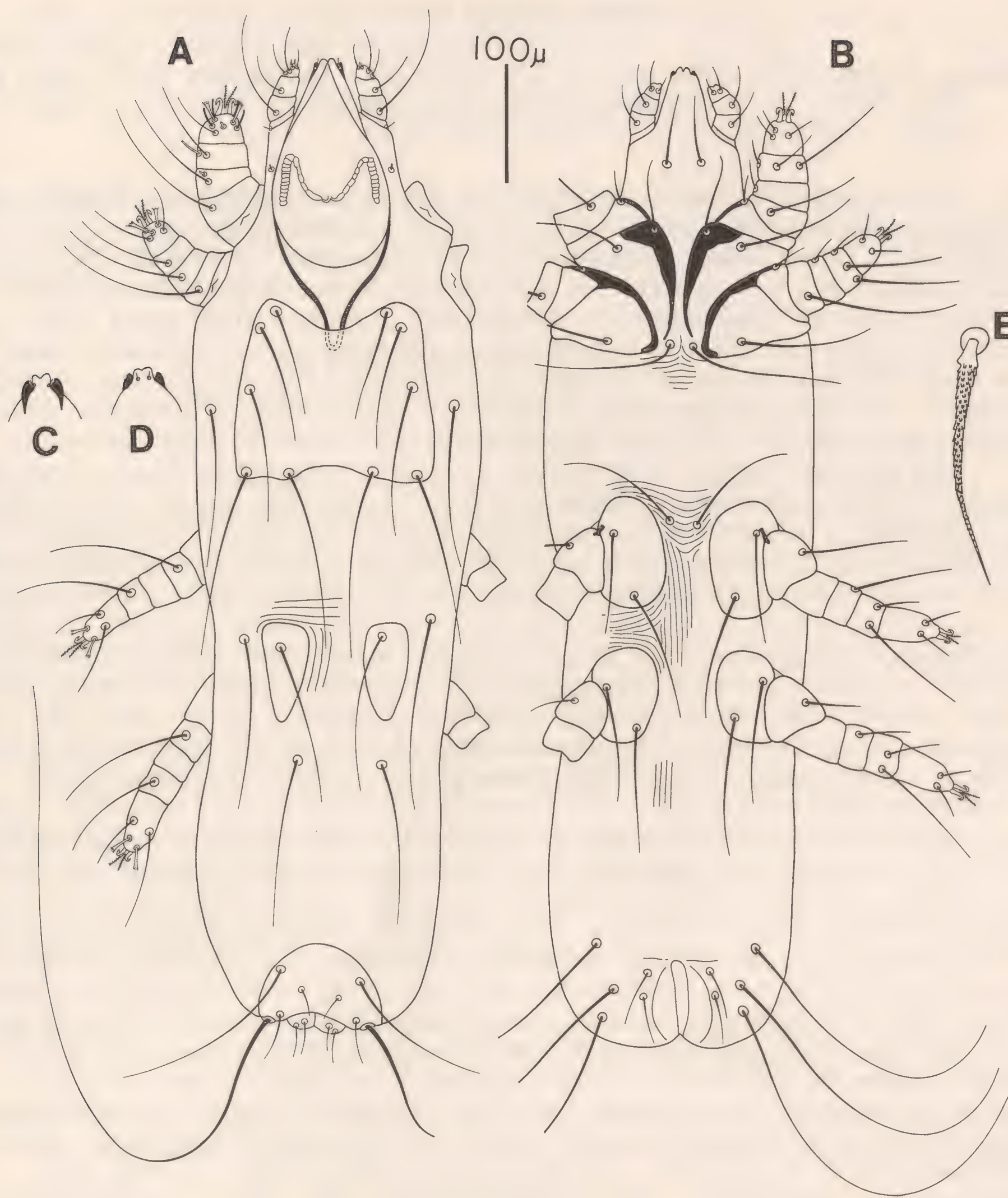


Fig. 36. Stibarokris phalacrus new species. Female (holotype): A, dorsal aspect; B, ventral aspect; C, hypostomal lips, dorsal aspect; D, hypostomal lips, ventral aspect; E, idiosomal seta, knobbed.

Genus Picobia Haller

Picobia Haller, 1878, Zeit. wiss. Zool. 30:81-91. - Oudemans, 1906, Mem. Soc. Zool. Paris, 19:73. - Dubinin, 1957, Mag. Parasitol. Inst. Zool. Akad. Sc. USSR., 17:71-136.

The truncate condition of the palpal tibiotarsus, thickened legs I and II, and the loss of leg setae sc1, sc2, dFIII and dFIV distinguishes Picobia from all other genera of Syringophilidae. This genus is strikingly different from all other syringophilid genera and its affinities are obscured by host adaptations and concomitant structural modifications. These small to medium sized mites (610 μ -780 μ) are found subcutaneously in the epidermal wing tissue of piciform birds of the family Picidae (Haller 1878), and have been taken from birds in the following families: Apodidae, Apodiformes; Phasianidae, Galliformes; Columbidae, Columbigiformes; Sturnidae and Turdidae, Passeriformes; and Upupidae, Coraciiformes.

Type Species: Picobia heeri Haller, 1878, ex. Picus canus Gmelin (= Gecinus canus), Picidae, Piciformes. (Type by original designation.)

FEMALE. (1). Hypostomal apex unornamented. (2). Lateral hypostomal teeth absent. (3). Chelicerae edentate. (4). Peritreme M-shaped; each lateral branch with 2-6 chambers; each longitudinal branch with 4-20 chambers. (5). Stylophore elongate, rounded posteriorly; variable relation to propodosomal plate. (6). Palpal tibiotarsus truncate (Fig. 2 B), segmental sutures indistinct. (7). Setae variable, spinose, knobbed, annulate, or smooth. (8). Propodosomal plate variable, divided, entire; sclerotization usually restricted to bases of vi, ve, sci. (9). Hysterosomal plate variable. (10). Setal pattern of propodosomal region with six pairs of setae arranged 2-2-2. (11). Setae 12, d3, 13 long; d3 closer to 12 or equidistant between 12 and 13. (12). Setae 14 long; d4, d5, 15 short. (13). Genital series with two pairs of setae; anal series with one pair of setae. (14). Paragenital series with three pairs of setae. (15). MCA1 variable, parallel, weakly convergent, or weakly divergent; MCA1 not fused to MCA2; MCA2 produced posteriorly beyond coxal field. (16). Coxae III and IV strongly sclerotized; posterior margin strong; articulation with trochanters prominent. (17). Cuticular striations as in Fig. 37 A, B; transverse between setal bases 3a; transverse between coxae III-IV. (18). Legs I and II subequal in thickness, 2-3 times thicker than III and IV. (19). Leg setae sc1, sc2, dFIII and dFIV absent. (20). Setae a' and a'' variable, rodlike on legs III-IV or absent; rodlike or irregularly serrate with 1-2 points on legs I-II. (21). Antaxial and paraxial members of claw pair III-IV variable, subequal or dissimilar; claws extending 1/4 length of empodium. (22). Orders of hosts: Apodiformes, Columbigiformes, Coraciiformes, Galliformes, Passeriformes, Piciformes, and Podicipediformes. (23). Types of feathers inhabit: unknown; P. heeri subcutaneous in wing tissue of Picus canus.

MALE. As in female except: (7). All setae smooth. (11). Setae d3, 13 short; d3 closer to 13 than to 12. (14). Paragenital series with two pairs of setae.

The genus Picobia includes 3 named and 6 new species. The named species are:

Picobia heeri Haller

Only the pertinent citations of this species are given.

Picobia heeri Haller, 1878, Zeit. wiss. Zool. 30:81-91. - Oudemans, 1906, Mem. Soc. Zool. Paris, 19:73. - Dubinin, 1957, Mag. Parasitol. Inst. Zool. Akad. Sc. USSR., 17:71-136

All type material of this species originally collected in Germany is lost, and representative material was not available for study.

Picobia dryobatis (Fritsch)
new combination

Syringophilus dryobatis Fritsch, 1958, Zool. Jahrbucher 86 (3):242-243, Fig. 10.

All the type material of this species originally collected from Dendrocopus major (L.), Picidae in Germany is lost, and representative specimens were not available for study.

Picobia zumpti (Lawrence)
new combination

(Fig. 37)

Syringophilus zumpti Lawrence, 1959, Parasitology, 49:425, Fig. 5.

The holotype of this species, on loan from the Natal Museum, was examined. Originally described from Streptopelia capicola (Sundemall) (Columbiformes: Columbidae) in South Africa, this species has not been recollected.

Owing to the paucity of the descriptions, the following species cannot be assigned with certainty to any of the existing genera:

Syringophilus anthi Fritsch, 1958, Zool. Jahrbucher 86(3):240-242, Fig. 9. ex.
Anthus trivialis (L.) (Passeriformes: Motacillidae), from Germany.

Syringophilus bisetatus Fritsch, 1958, Zool. Jahrbucher 86(3):238, Fig. 7. ex.
Sylvia communis Latham (Passeriformes: Sylviidae), from Germany.

Syringophilus glandarii Fritsch, 1958, Zool. Jahrbucher 86(3):235-238, Fig. 6.
ex. Garrulus glandarius (L.) (Passeriformes: Corvidae), from Germany.

Syringophilus major Berlese, 1878, Ac. Myr. Scorp. Ital., fasc. 37, no. 9 and 10. ex. Fringilla montifringilla (L.) (Passeriformes: Fringillidae), from Europe.

Syringophilus troglodytis Fritsch, 1958, Zool. Jahrbucher 86(3):238-240, Fig. 8.
ex. Troglodytes troglodytes (L.) (Passeriformes: Troglodytidae), from Germany.

DEVELOPMENT

The life history stages are typical of the cheyletoids (Hughes, 1961), comprising the egg, larva, and two nymphal stages prior to the adult. The deutonymphal stage is lacking. Although genital setae are still lacking, leg chaetotaxy is complete in the tritonymph, except for sc4.

A complete series of the life stages was not available for all the species studied. There are differences in the pattern of addition of setae in the immature stages. However, the following conditions hold for all genera: dGI is added in the protonymph; vs'I, vs'II, vs'III and dFII are either present or absent in the larva--if absent they are not added; dGII, if present in the adult, is added in the protonymph.

The developmental pattern of Syringophilus bipectinatus Heller, 1880,

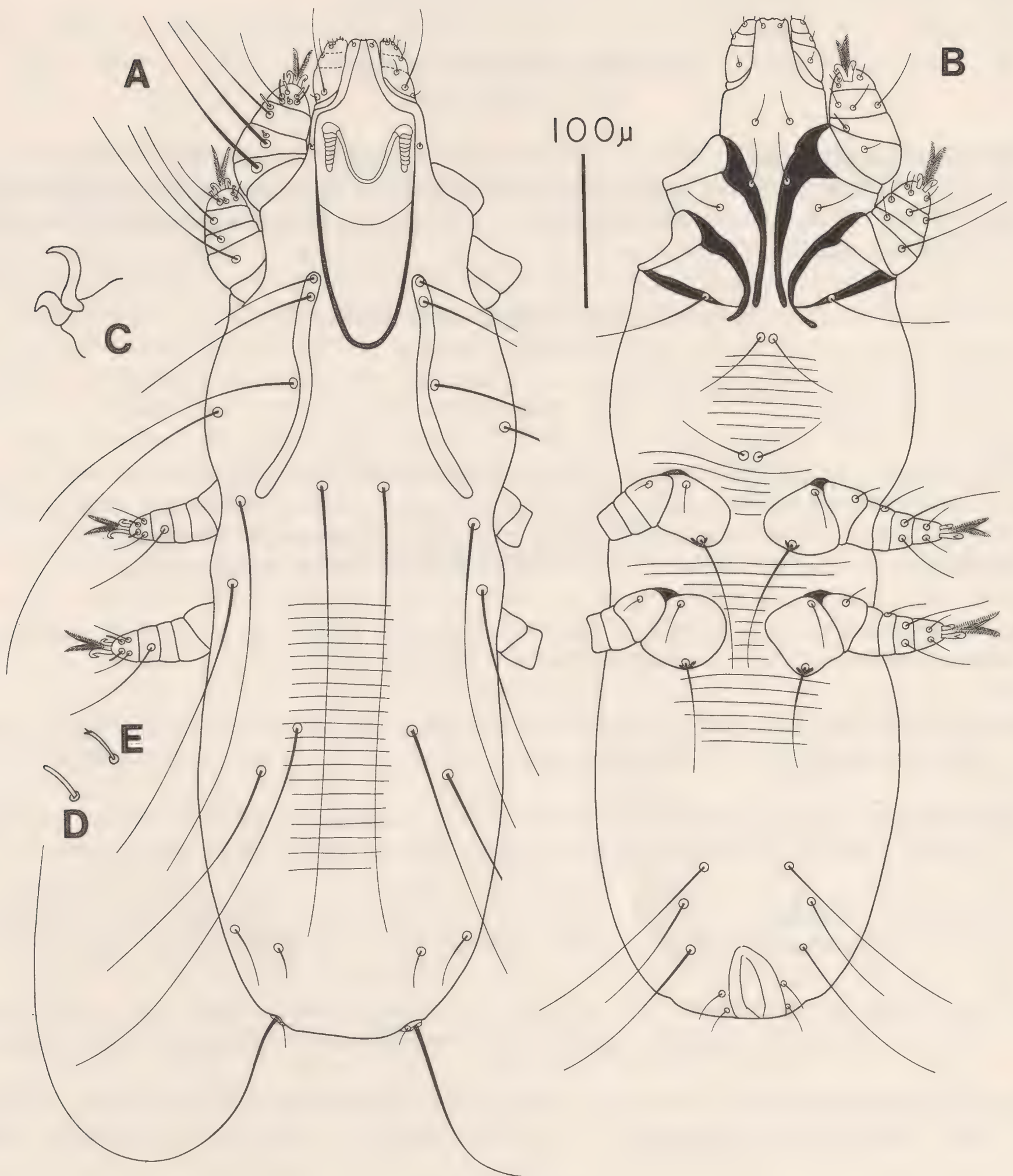


Fig. 37. *Picobia zumpti* (Lawrence). Female (holotype): A, dorsal aspect; B, ventral aspect; C, claws tarsus IV; D, $\underline{a}'\text{III}$; E, $\underline{a}'\text{I}$.

(Table II), was chosen for illustrative purposes because in this species most of the diagnostic characters employed in generic classification are present. In addition, since *S. bipectinatus* is the type species for the family, it is employed here as an arbitrary standard to which other members of the family may be compared.

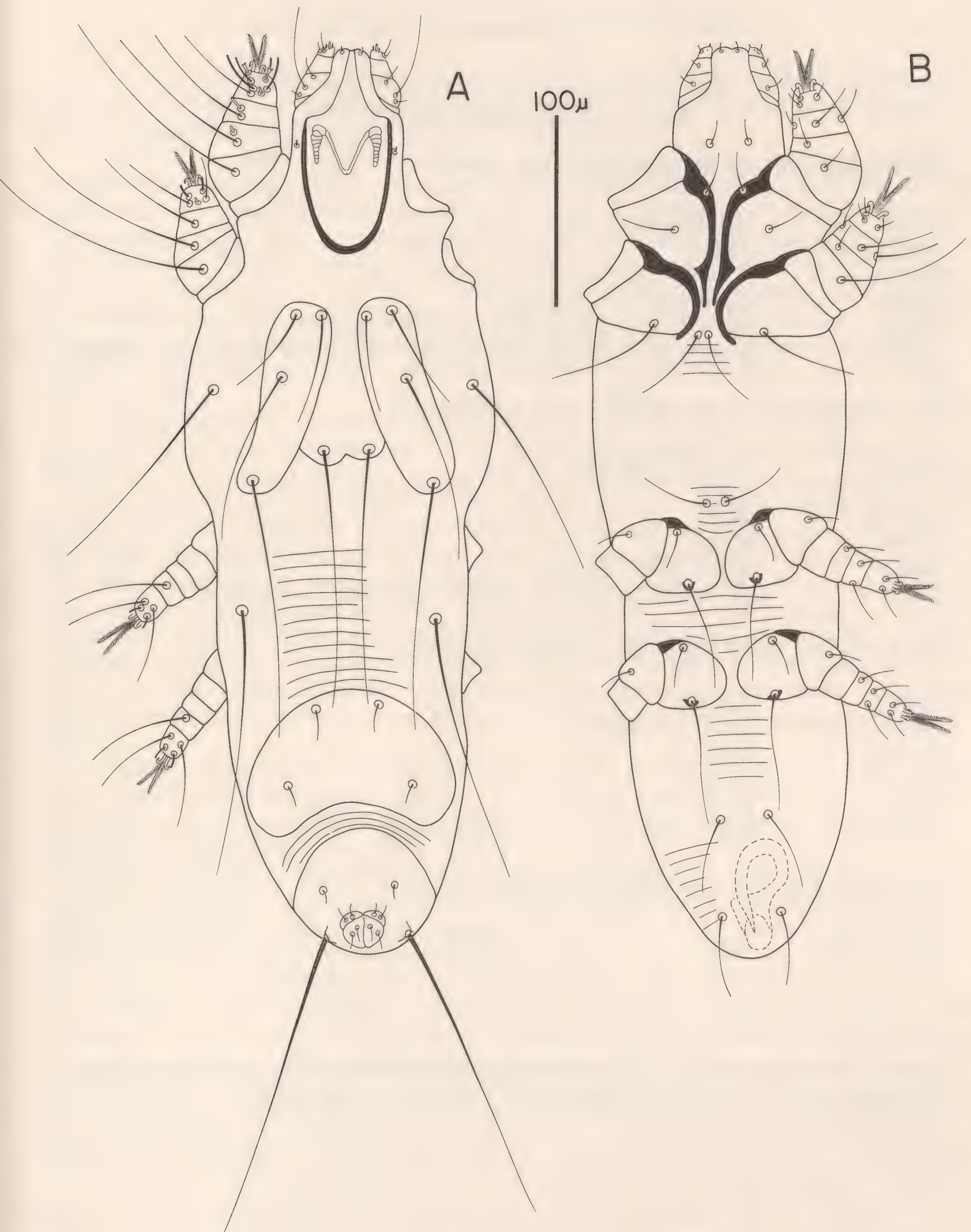


Fig. 38. Picobia sp. Male: A, dorsal aspect; B, ventral aspect.

TABLE II

Leg chaetotaxy of developmental stages of
Syringophilus bipectinatus Heller

The following setae are present in the larva:

Coxae	<u>1b</u> , <u>2a</u> , <u>3a</u> .
Trochanters	none
Femora	<u>dFI</u> -III, <u>vFI</u> -II.
Genua	<u>lGI</u> -II, <u>lG</u> "III, <u>sigma</u>
Tibiae	<u>dTI</u> -III, <u>vTI</u> -III, <u>lT</u> 'I-II, <u>lT</u> "I-III, <u>phi</u> .
Tarsi	<u>u</u> 'I-III, <u>u</u> "I-III, <u>vs</u> 'I-II, <u>ft</u> , <u>tc</u> 'I-III, <u>tc</u> "I-III, <u>P</u> ', <u>P</u> ", <u>omega</u> I-II.

The following setae are added in the protonymph:

Coxae	<u>1c</u> , <u>2b</u> , <u>3b</u> , <u>3c</u> .
Trochanters	none
Femora	<u>dFIV</u> .
Genua	<u>dGI</u> -II.
Tibiae	<u>dTIV</u> , <u>vTIV</u> , <u>lT</u> "IV.
Tarsi	<u>TC</u> 'I, <u>TC</u> "I, <u>a</u> 'I-III, <u>a</u> "I-III, <u>u</u> 'IV, <u>u</u> "IV, <u>tc</u> 'IV, <u>tc</u> "IV.

The following setae are added in the tritonymph:

Coxae	<u>4b</u> , <u>4c</u> .
Trochanters	<u>sc1</u> , <u>sc2</u> , <u>sc3</u> .
Femora	none
Genua	<u>lG</u> "IV
Tibiae	none
Tarsi	<u>a</u> 'IV, <u>a</u> "IV.

The following seta is added in the adult:

Trochanters	<u>sc4</u> .
-------------	--------------

NOTE: The eupathid pair (TC) changes from setiform in the larva (tc) to true eupathid type in the protonymph; (P) is eupathid on the larva.

BIONOMICS AND HOST-PARASITE RELATIONS

All known species of syringophilids are found inside the calmus of wing feathers (primaries, secondaries, and coverts), or in the case of Picobia heeri, in the subcutaneous tissue of the wing of Picus canus.

The mites remain inside the calmus, and leave only at the onset of molting to seek new feathers. Thus, reproduction and development take place within the quill. All life stages feed by inserting the long, needle-like chelicerae through the fibrous wall of the calmus into the flesh of the wing. The haplodiploid system is used to limit the number of males to one for every ten to fifteen females. Dispersal from an old, about to be molted, feather to a newly developing feather is accomplished by females presumed to be non-gravid, but fertilized. Either the mites enter the new calmus when the superior umbilicus of the developing feather is unobstructed or they make an entrance hole in the region of the superior umbilicus.

During dispersal, the mites exhibit a preference for certain feathers. The phenomenon of site selection may be explained in terms of two components--a feather component and a mite component--each involving several variables.

The feather varies in volume of the calmus; calmus wall thickness; frequency of feather molts per breeding cycle of host; pattern or sequence of molting of the feathers within the various tracts and the coordination between tracts. The mites vary as to: volume of a female mite; fecundity; volume occupied by one generation of progeny; number of generations per quill molt; number of females invading a quill; reproductive interaction among females in instances of multiple invasions; mobility of the mites, and the ability to create a hole in the calmus for entry. Combinations of the above factors appear to limit the mites to specific feathers and offer the basis for the evolution of feather preferences among the mites.

Indeed, adaptations restrict mites to specific conditions so that some genera are limited to specific feather tracts. For example, an individual passerine bird may have a species of Syringophilopsis in the primaries, a species of Syringophiloidus in the secondaries, and a species of Aulonastus in the coverts. Simultaneous collection of species representing two genera of quill mites from the same individual host has occurred from Turdus migratorius, Agelaius phoeniceus, Passer domesticus, and Sturnus vulgaris. In addition, representatives of two genera are known from the same species of host for five other species of syringophilids, although the mites were not collected from the same host individual.

Molting by the host forces mites to move from quill to quill. In contrast, the movement of mites from host to host is governed by the periods and types of contact between hosts. Thus, the events of mating and nesting, and periods of gregariousness of the host afford opportunities of possible transmission. Most of the transfers between individual birds may occur during the nesting period of the host. The timing of these transfers must be correlated with development of the offspring at hatching, and the length of exposure of the immature bird to the adults.

The genera of Syringophilidae are now known to parasitize sixteen orders of birds. For the most part, the genera appear to be specific at the ordinal level of the avian host. Of the seven cases of ordinal overlap, only one lacks a possible explanation. The ordinal crossing-over can be explained in the same way used by K. C. Emerson (1962), and T. Clay (1949, 1950, 1957) to resolve confusing host associations of bird lice.

Of the one hundred twenty-two species of quill mites examined, only eight are known from more than one host species. Examination of additional hosts may

show that this initial sampling suggests too great a host specificity. It is apparent that the current study represents only a beginning, and that an enormous fauna is unknown.

HOST-PARASITE LIST

ORDER: PROCELLARIIFORMES

Bulweria bulweria (Jardine and Selby), 1828
Syringonomus bulwerius new species

Procellariidae

ORDER: PELECANIFORMES

Phalacrocorax auritus (Lesson), 1831
Stibarokris phalacrus new species

Phalacrocoracidae

ORDER: CICONIIFORMES

Casmerodius albus egretta (Ord), 1825
Trypetoptila casmerodia new species

Ardeidae

ORDER: ANSERIFORMES

Branta canadensis (L.), 1758
Chenophila branta new species

Anatidae

ORDER: GALLIFORMES

Gallus gallus (L.)
Syringophilus bipectinatus Heller

Phasianidae

ORDER: GRUIFORMES

Gallinula chloropus (L.), 1758
Ascetomylla gallinula new species

Rallidae

ORDER: CHARADRIIFORMES

Charadrius wilsonia wilsonia Ord, 1814
Selenonycha baltoda new species

Charadriidae

Aramus scolopaceus (Gmelin), 1789

Scolopacidae

Niglarobia trouessarti (Oudemans)

Ereunetes pusillus (L.), 1766

Niglarobia ereuneti new species

Tringa ochropus (L.) 1758

Niglarobia helleri (Oudemans)

Tringa totanus (L.), 1758

Creagonycha totana (Oudemans)

Anous tenuirostris (Temminck)

Laridae

Philoxanthornea anoa new species

Larus delawarensis Ord, 1815

Creagonycha lara new species

ORDER: COLUMBIFORMES

Columbia livia Gmelin, 1789

Columbidae

Peristerophila columbae (Hirst)

Streptopelia capicola (Sundemall), 1857

Picobia zumpti (Lawrence)

Zenaidura macroura (L.), 1758

Peristerophila zenadoura (Clark)

ORDER: PICIFORMES

Dendrocopus major (L.), 1758

Picidae

Picobia dryobatis (Fritsch)Picus canus Gmelin, 1788Picobia heeri Haller

ORDER: PASSERIFORMES

Mimus polyglottos (L.), 1758

Mimidae

Torotroglia mima new speciesHylocichla fuscescens (Stephans), 1817

Turdidae

Syringophilopsis hylocichla (Clark)Turdus pilaris (L.), 1758Syringophilopsis turdus (Fritsch)Phainopepla nitens (Swainson), 1837

Ptilgonatidae

Torotroglia villosa (Hancock)Dendroica coronata (L.), 1766

Parulidae

Aulobia dendroicus (Clark)Seiurus aurocapillus (L.), 1766Syringophiloidus seiurus (Clark)Passer domesticus (L.), 1758

Ploceidae

Syringophiloidus minor (Berlese)Agelaius phoeniceus (L.), 1766

Icteridae

Syringophilopsis elongatus (Ewing)Carduelis carduelis (L.), 1758

Fringillidae

Syringophilopsis fringilla (Fritsch)Fringilla coelebs (L.), 1758Syringophilopsis fringilla (Fritsch)Passerina cyanea (L.), 1766Syringophilopsis passerina (Clark)Pipilo erythrophthalmus (L.), 1758Aulonastus pipili new species

There is considerable literature concerned with the diagnosis and treatment of domestic avian parasites. Comments concerning Syringophilus bipectinatus, which occurs on domestic chickens, and P. columbae from pigeons, have appeared in veterinary publications and are extremely numerous that only a few are given below.

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